Power Computing Zooms Further: New 225MHz Mac, Page 40

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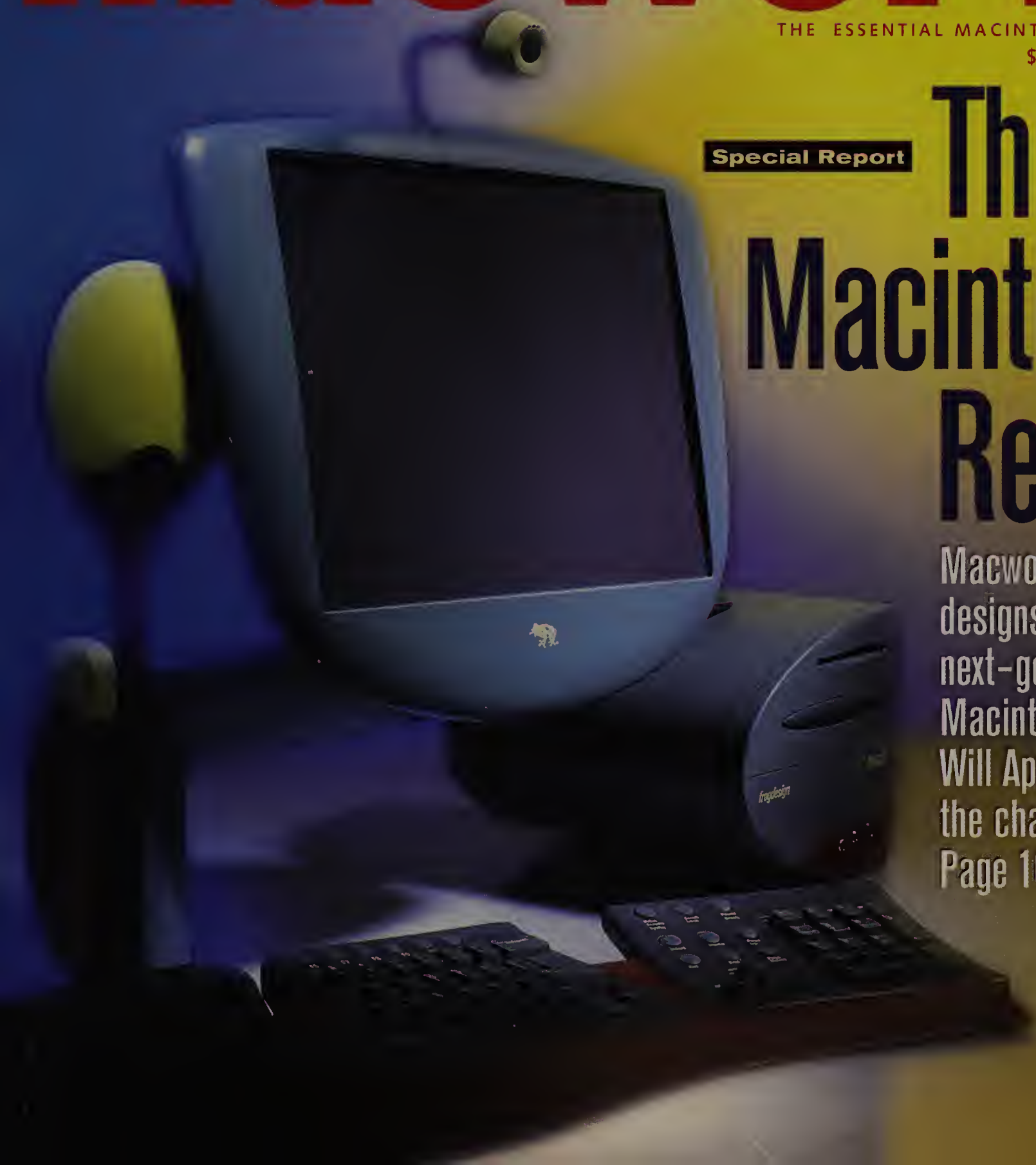

Special Report

The Macintosh Reborn

Macworld designs the next-generation Macintosh. Will Apple meet the challenge? Page 104.

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System 7.5 Update 2.0 from Apple Computer. Now you can get the most from your Mac with Apple's free update for System 7.5 users. This update will improve overall stability and performance and, if you use Virtual Memory on your PowerMac, start your applications up to four times faster than before.

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Nothing to lose.

{THEY'RE ALL FREE.}

the System 7.5 Update 2.0, please visit **//www.microsoft.com/macoffice/**. Or to order a free Microsoft Empowerment Pack for the Mac, which includes a CD-ROM with the software listed above plus a special offer on RAM from Kingston Technology, call 800-469-6520 Dept. MCA.

Microsoft

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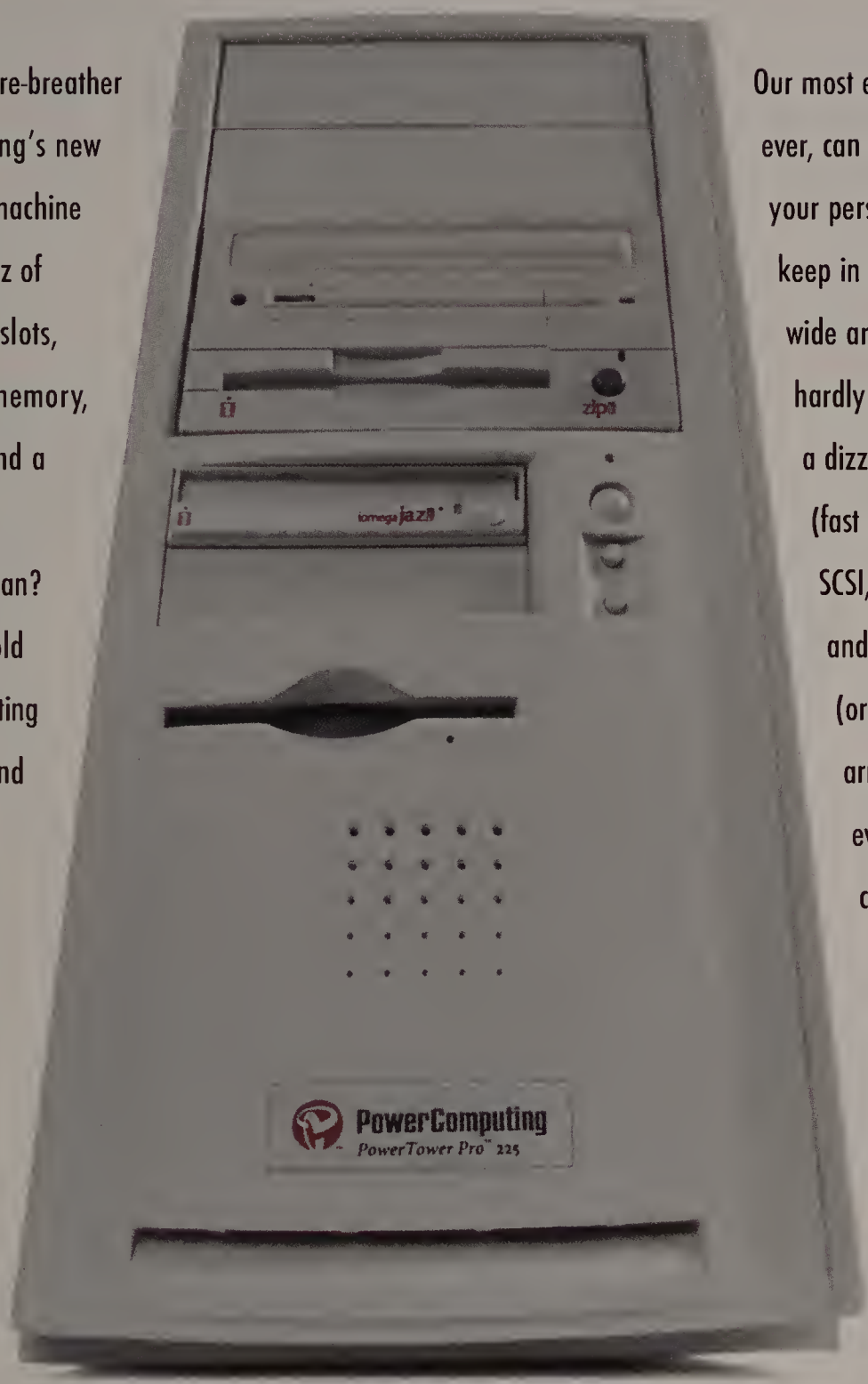
FEELING LIKE IT'S TIME TO MOVE ON?

STEP UP TO 225 MHZ.

Here it is, the mother fire-breather of them all. Power Computing's new PowerTower Pro. The ONLY machine PowerPC™ packing 225 MHz of retina-flashing speed, 6 PCI slots, 8 DIMM slots, interleaved memory, dual processor capability and a 300W power supply.

But what does it all mean? Well, it means pawn your old system off on some unsuspecting sucker as soon as possible and get a PowerTower Pro.

Seriously, this machine is torqued with an upgrade-able CPU and 9 drive bays so it'll be putting most computers to shame for years to come.



Our most expandable Mac OS system ever, can be configured to your personal needs, but keep in mind, it comes with a wide array of features that can hardly be called standard. With a dizzying 8X CD ROM, dual (fast internal 10 MB/second) SCSI, a 1 MB Level 2 cache, and a 7200 RPM hard drive (or optional Ultra SCSI/RAID array), this machine has every super-power you could ever need.

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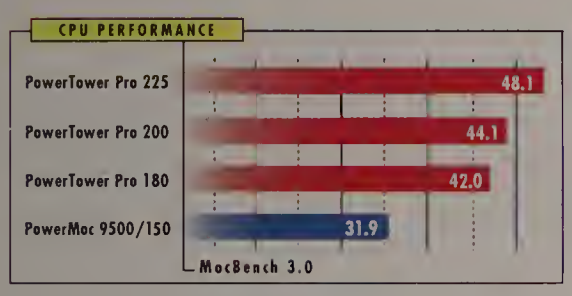

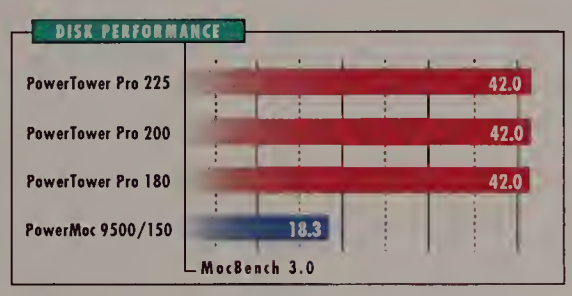

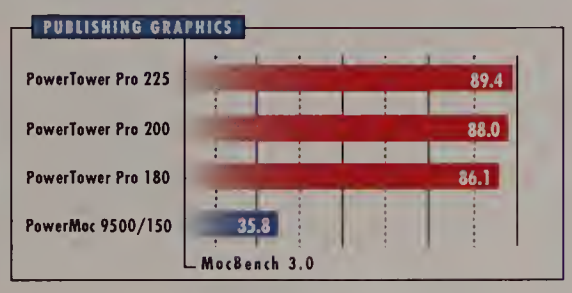

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SEPTEMBER 1996

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Features

Macworld Presents

104 The Mac Reborn
Two new, completely innovative Macintosh systems that could catapult Apple again to the forefront of computer design. Only Apple didn't design them—we did. Take a look at where the cutting edge of computing should be.

120 Top 20 Photoshop Plug-ins
BY DEKE McCLELLAND The 20 most essential, exciting, and affordable Photoshop add-ons for productivity, special effects, 3-D, and color output.

132 Desktop CD Recorders
MW LAB
BY PETER M STOLLER Want to burn your own CDs? Macworld Lab compares 11 CD-R drives and uncovers several easy-to-use, reliable winners.

140 Huge Hard Drives
MW LAB
BY BRETT GLASS Macworld Lab tests 4GB to 9GB hard drives for speed, performance, and price.

Blueprints for a totally new, very bold Mac of the future.

Opinion

19 Letters

27 State of the Mac
BY ADRIAN MELLO The Mac community: what makes us tick.

33 The Desktop Critic
BY DAVID POGUE The best and—ugh!—worst product-interface design.

140 Viewpoint
BY DOUGLAS ADAMS Yes, *that* Douglas Adams.

ON THE COVER
Photograph by Rick English

Has Hollywood turned its back on the Mac? Page 41.

News

Macworld Exclusive

40 225MHz Power Mac Ships
MW LAB
Power Computing's 604e-equipped PowerTower Pro sports the fastest speed of *any* PC.

41 Big Changes Online
The Internet is forcing the Big Three—America Online, CompuServe, and Prodigy—to rethink their online strategies.

43 The Monitor's New Course
Flat-panel displays are neck and neck with CRT monitors in every respect except price. But how long will that be a barrier to flat panels on the desktop?

Special Report

46 Font Upheaval
Adobe shakes up the font market with a new version of ATM and a deal with Microsoft to develop a new type standard.

Macworld Lab tests the latest laser printers in Buyers' Tools, page 181.

Secrets

151 The Art of Juggling Extensions
BY JOSEPH SCHORR How to stay afloat in a sea of System extensions.

157 Quick Tips
BY LON POOLE Tips, tricks, and shortcuts.

165 NetSmart
BY MATTHEW HAWN On the line and overloaded.

Media

171 Animate Your Web Site
BY JIM HEID Use GIFs to add animation without hassle.

174 Publishing Workshop
BY DAVID BLATNER If you're not using styles in QuarkXPress, you should be.

178 Graphics Workshop
BY CATHY ABES A design pro's tips for mixing type and images.

Buyers' Tools

181 Personal Laser Printers
BY ROBERT C. ECKHARDT
Macworld Lab examines 11 home- and small-office laser printers with an eye toward the best combination of quality, price, and trouble-free performance.

185 Consumer Advocate
BY JAMES A. MARTIN How to trim unwanted spam calories from your E-mail diet.

189 Star Ratings
Macworld's ratings for hundreds of hardware and software products at a glance.

14 How to Contact Macworld

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Take Photoshop to new heights with 20 of the best add-ons, page 120.

Reviews

56 ★★★/6.9 **Cyberdog**
OpenDoc Internet tool

58 ★★★/5.5 **OrangePC 440;**
★★/4.3 **Power Mac 7200/120 PC Compatible;**
★★/4.2 **SoftWindows 3.0;**
★★/4.3 **SoftWindows 95**
PC-compatibility solutions compared

60 ★★★★/8.2 **Here & Now 2.0;**
★★★/5.9 **Mac Drive 95;**
★★★/6.7 **MacOpener 2.0;**
★★★/6.8 **MacTransfer;**
★★★/5.1 **TransferPro;**
★★/3.7 **XChange 1.2**
Cross-platform file utilities compared

67 ★★★★/7.8 **Let's Keep It Simple Spreadsheet**
Spreadsheet application

68 ★★★★/8.6 **Netopia 440;**
★★★/6.8 **Pipeline 25;**
★★★★/7.1 **Pipeline 50**
ISDN routers compared

70 ★★★/6.9 **Pacesetter;**
★★★/5.9 **Pipeline 130**
Frame-Relay and ISDN routers compared

72 ★★★/6.0 **MasterJuggler Pro 2.0;**
★★★/6.1 **Suitcase 3.0.1**
Font-manager utilities compared

75 ★★★★/8.1 **Apple Network Server 700**
Unix-based server

76 ★★★★/7.5 **Digital Performer 1.71;**
★★★★/7.2 **Studio Vision Pro 3.0.3**
MIDI sequencers with digital audio compared

79 ★★★/6.5 **Color QuickCam**
Digital video camera

81 ★★★★/7.0 **Sculpt 3D 4.1**
3-D modeling and rendering

83 ★★★/6.1 **Ready,Set,Go 7.0.2**
Resurrected desktop publishing program

85 ★★/4.6 **Fujix DS-220**
Digital camera

87 ★★★/5.6 **LaserMerge Electronic Paper 2.0**
Collection of printing utilities

89 ★★★/5.2 **Jumpstart Your Job Skills 1.5;**
★★★/6.9 **ResumeMaker Deluxe CD**
Résumé-builders compared

90 ★★★★★/9.5 **DeltaGraph 4.0**
Flowchart program

92 ★★★★/7.0 **GeoQuery 5.0**
Mapping software

94 ★★★★/7.7 **Toy Story Animated StoryBook**
Read-along CD-ROM for little kids

96 ★★★★/8.8 **Bad Mojo**
Kafka-esque adventure game

98 ★★★/6.4 **Alps Adjustable Mouse**
Cross-platform input device

100 ★★/3.8 **Chaos**
CD-ROM game

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— MacWEEK Magazine 4.29.96 ♦♦♦♦

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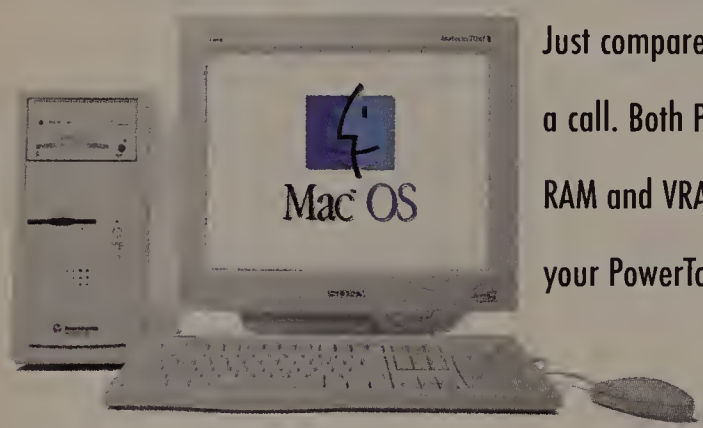

MacWeek

"POWER COMPUTING HAS FIELDED SOME KILLER MACHINES. APPLE WILL BE HARD PRESSED TO CATCH-UP."
— MacUser Magazine July, 1996

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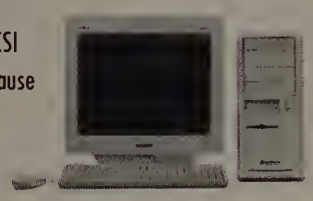

PowerTower Pro 200
200MHz PowerPC 604e Processor
- 16 M8 RAM (1G8 M8 Max)
- 2 G8 7200 RPM AV Capable Hard Drive
- 8x CD-ROM Drive
- 1MB Level 2 Cache
- 8M8 IMS Twin Turba 128 bit Graphics Acceleratar
- 6 PCI Expansian Slats
- Interleaved Memary
- 9 Drive Bays
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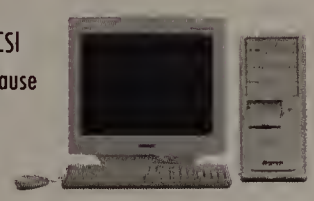

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- Cannectix Speed Daubler
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- Quad-Speed (4x) CD-ROM Drive
- 512K Level 2 Cache
- 2 MB VRAM On-Baard (4 MB Max)
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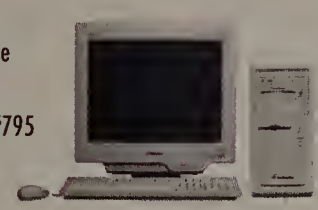

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120MHz PowerPC 604 Processor
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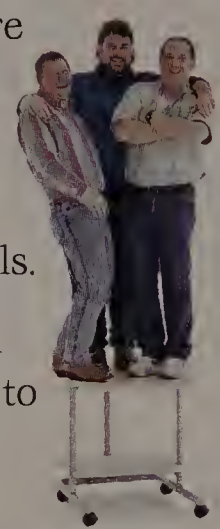

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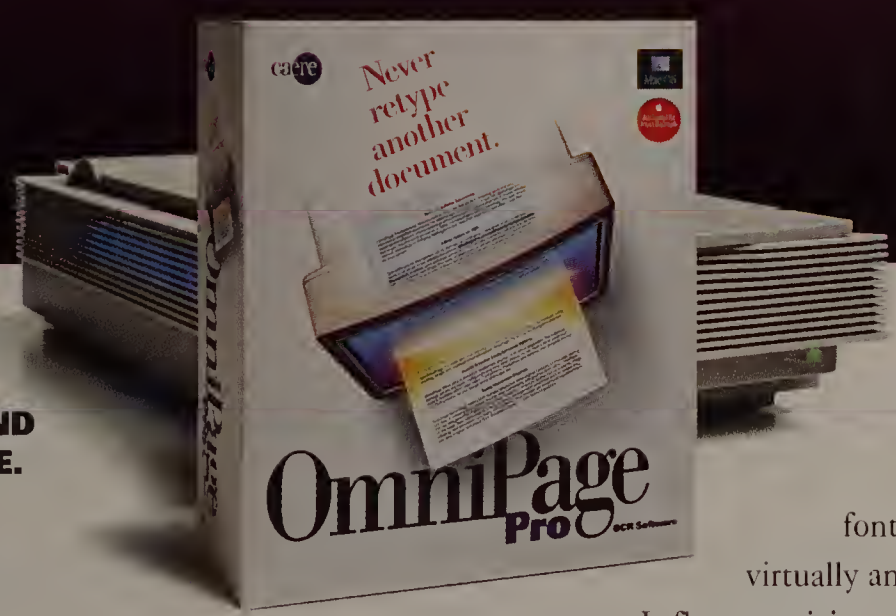

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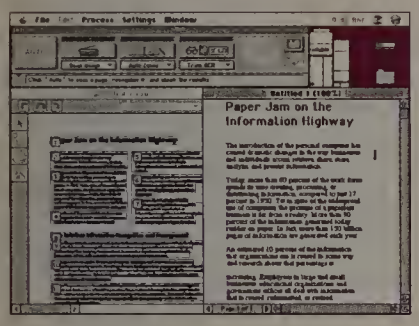

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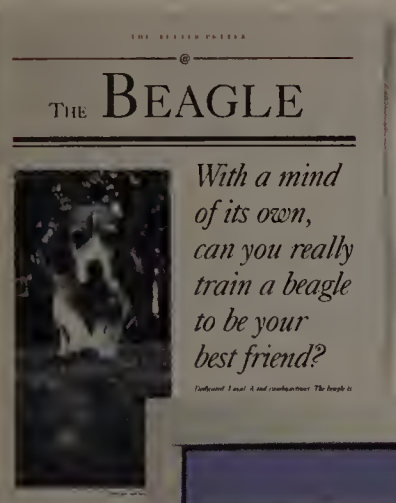

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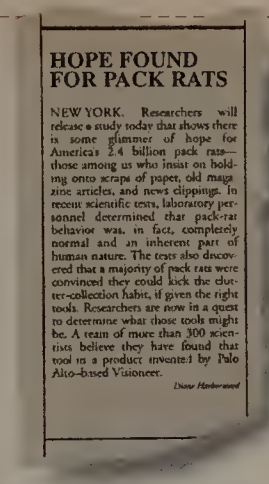

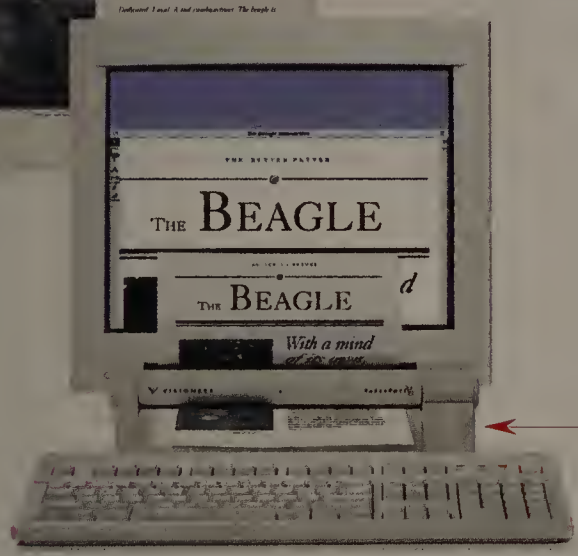

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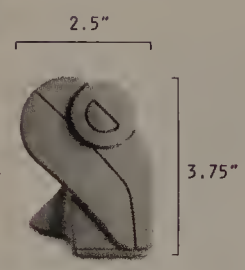

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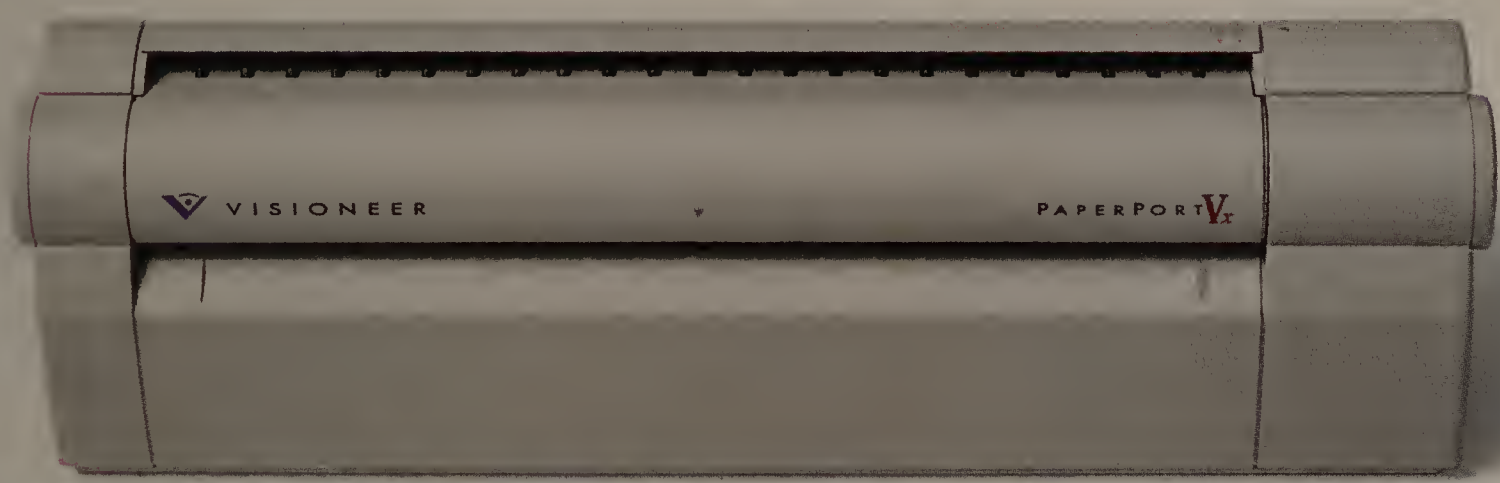

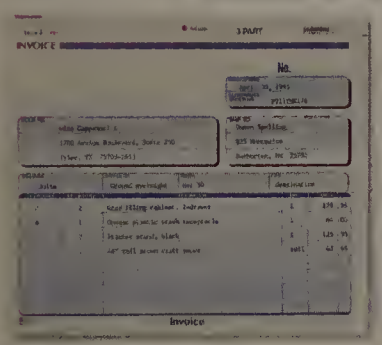

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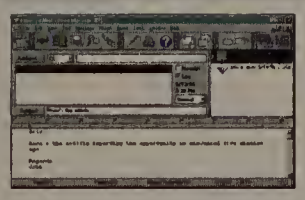

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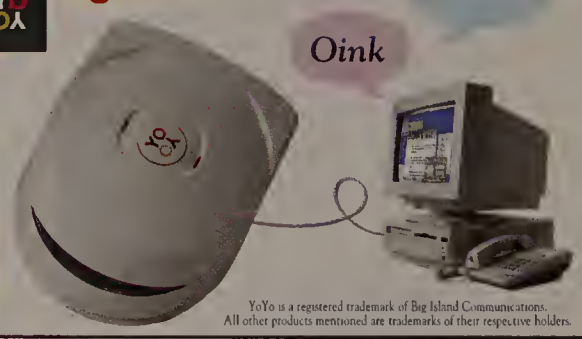

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FOUNDER David Bunnell

FOUNDING EDITOR Andrew Fluegelman 1943–1985

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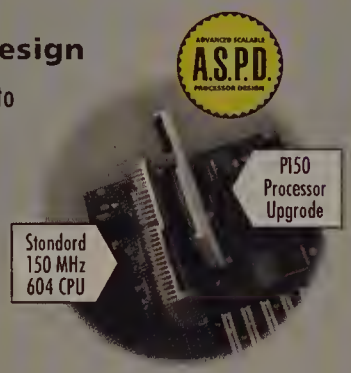

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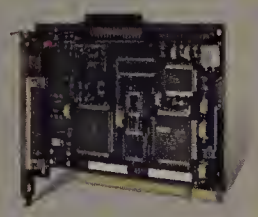

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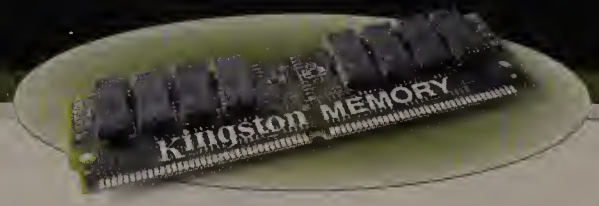

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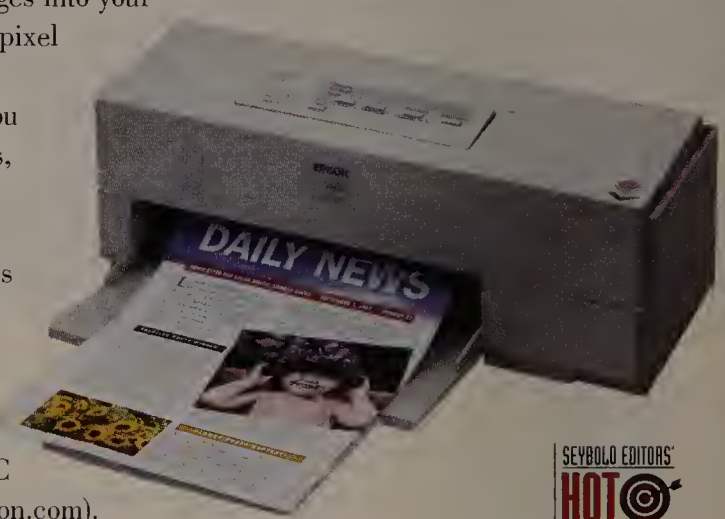

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Letters

Secrets, Essentials, Details

"OFFICE SECRETS" WAS GREAT (JUNE 1996). Some of the FileMaker Pro secrets also apply to ClarisWorks:

• Text-block hopping (using ⌘-option and an arrow key to move to the beginning or end of a line or block) works in a text frame in any ClarisWorks document.

• In ClarisWorks you can also select multiple objects that lie partially within the selection rectangle in database-layout mode, or in a drawing, by using the ⌘ key as a modifier.

• You can create text frames in ClarisWorks with a fixed right margin to force text-wrapping. Just use the option key as a modifier when you click and drag with the text tool.

DAVID CROWE
Calgary, Alberta, Canada

IN "OFFICE ESSENTIALS" YOU EXTOL the virtues of Now Utilities' Key Capture (June 1996). However, users of that enhancement should be aware that when you type a password, to open a document or to log on to an E-mail account, Key Capture saves those keystrokes as well. Anyone with two minutes' access to your machine can copy Key Capture's Saved Work file and learn your passwords.

If you use passwords, play it safe and turn off Key Capture. If you feel compelled to use it, define a user key to toggle Key Capture on and off.

MARTIN FISHER
Eugene, Oregon

FINALLY, WORDPERFECT GETS THE praise it deserves ("The Macworld Office," June 1996). Here's hoping Corel keeps it alive!

STEPHEN TANNENBAUM
Thornhill, Ontario, Canada

GORDON STUDER

Rage against the Gore

I AGREE WITH READER MATT SEGUR that game manufacturers have the right to make violent games (*Letters*, June 1996). However, reviewer Fred DeLisio should be commended for having enough taste to object to the excess of brainless violence in Marathon 2. Other publications seem to award ratings directly proportional to the amount of gore involved.

RAUL REGALADO
Toronto, Ontario, Canada

Tech Support on the House

ACCORDING TO "SCREEN-LAYOUT Secrets" (*Media*, June 1996), "unless you're using Director 5 . . . layers won't import directly into an authoring program." The column doesn't explain how to import these layers into Director, and Director's manuals make no mention of Photoshop or layers. I am loath to start my mere 30 days of free Director tech support with a minor question like this, so—how do you do it?

STEPHANIE GIOVANNINI
Dayton, Ohio

Director can't import layers on its own; you'll need a third-party plug-in to get the job done. Hie thee to Media Lab's Web site, http://www.medialab.com/software, *and check out PhotoCaster. Or give them a call at 303/499-5411.—Ed.*

Fat's Enough

I HAVE TROUBLE KEEPING TRACK OF the arrow cursor on the screen of my Performa. I was wondering if there is any way that I can enlarge the cursor. I contacted Apple customer service many times, but none of them have a clue what to do. You guys are my last hope, so please tell me what to do.

HARRIS SINGER
via the Internet

We've got just what you're looking for: Fat Cursors 1.2.1, a $10 shareware control panel from Robert Abatecola. It was originally designed to fatten up the scrawny cursor on PowerBook screens, but it works on desktop Macs too (take it from Macworld *associate editor Cathy Abes, a satisfied user). Biggy 2.0.2 from RJ Cooper and Associates is an $89 utility that lets you choose among several very big left and right arrows and can double the size of other pointers. Both Fat Cursors and a demo of Biggy are available in Macworld Online's forum on America Online (keyword* Macworld*) and on the Web (*http://www.macworld.com/software/*).—Ed.*

continues

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Circle 4 on reader service card

CORRECTIONS

- *The correct URL for Okra is* http://okra.ucr.edu/okra/ *(*News*, June 1996).*
- *The Hewlett-Packard LaserJet 4MV can print to within 1/6 inch on letter-size paper ("Heavy Duty Printers," June 1996).*

Cool, Hip, Wrong

YOUR REVIEW OF BBEDIT 3.5.2 SEEMED very narrowly focused (June 1996). While the review correctly acknowledged BBEdit's powerful HTML extensions, it completely neglected the features that make BBEdit a powerful text editor. Integration with Metrowerks' CodeWarrior and Symantec C++ went unnoticed, as did BBEdit's ability to create and edit very large files. BBEdit's multiple-file search-and-replace functions and its ability to translate between Unix, Mac, and DOS text files weren't mentioned either.

I realize that the Web seems cool and hip to your reviewers, but BBEdit provides a slew of unique features that make it useful, even essential, to Macintosh programmers and high-end users. A good review would have acknowledged BBEdit as more than a Web-page–design tool. BBEdit's features and extension architecture make it an indispensable program.

ROGER KUMAR
Rolla, Missouri

I absolutely agree that BBEdit is a powerful program, but since BareBones is selling it as an alternative to WYSIWYG programs such as Adobe PageMill, I chose to focus on its HTML tools. Unfortunately, space limitations prevented me from listing all of its features. I do stand by my assessment of BBEdit's steep learning curve. It is a complex and powerful program. Most Macworld *readers aren't programmers, and the complexity of the application makes it difficult for beginners to master quickly. But as I said in the review, if you need that power and flexibility, BBEdit is well worth the effort.*
—Matthew Hawn

Freeware versus Shareware

SUZANNE STEFANAC'S "COPYRIGHT Ain't Dead . . . Yet" (*NetSmart*, June 1996) seems to suggest public domain–ware includes freeware: "Some materials—freeware, for instance—can be used or passed on without attribution or fee because the author voluntarily relinquishes the copyright." I know many authors, including myself, who would hotly contest the suggestion that they have relinquished copyright even though they choose not to charge for their product. Freeware is free, all right, but the author retains all copyrights. Public domain–ware is not only free, but all rights of ownership have been released.

Ms. Stefanac's statement that public domain–ware can be passed on without attribution is at least as objectionable. I am stunned that a publication as prestigious as *Macworld* would encourage distribution of material without attribution! Unless there are specific arrangements to the contrary, as with ghostwriting or employer ownership of employee production, one should at least acknowledge a work's source.

DOUGLAS GATES
Chicago, Illinois

I FOUND YOUR COLUMN ON COPYRIGHT doctrine as applied to the Net particularly helpful as I prepared for a law school final examination on that subject. Contrary to your article, however, not all government publications are public domain. Section 105 of the Copyright Act exempts only "any work of the United States Government." Thus, publications of state governments that meet certain specifications can also receive copyright protection.

AARON E. KORNBLUM
Madison, Wisconsin

Doctors Dissed

THANKS FOR YOUR COLUMN "FINDing a Computer-Savvy Doctor" (*Consumer Advocate*, June 1996). As a general internist, I see my share of patients with repetitive strain injuries. Although I sometimes need to refer them for specialist care, most of the simple injuries can be treated easily, often with the help of an occupational or physical therapist. Thanks for making it clear that not every ache and pain requires a high-tech solution or a high-priced specialist.

CATHERINE HENRY, M.D., F.A.C.P.
Cleveland, Ohio

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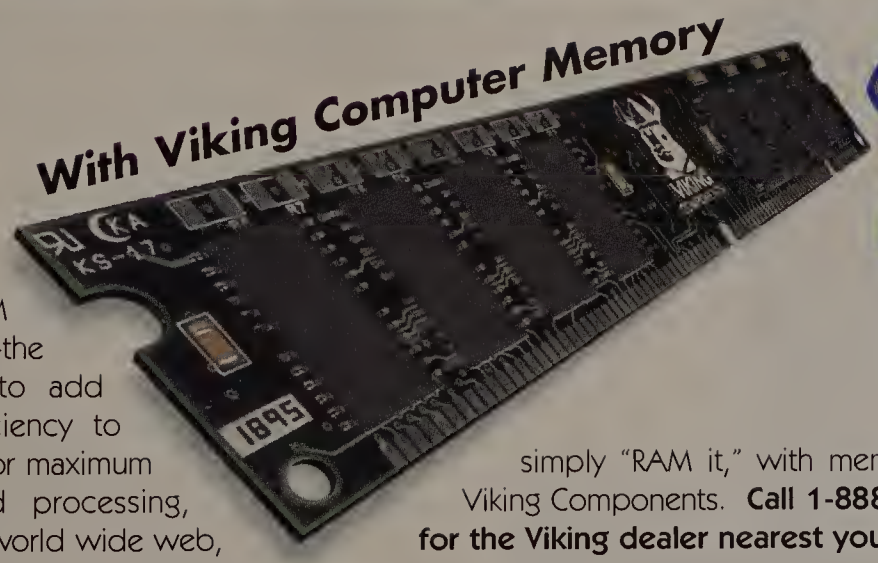

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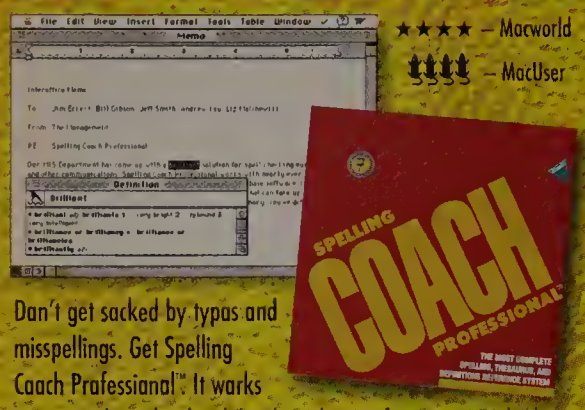

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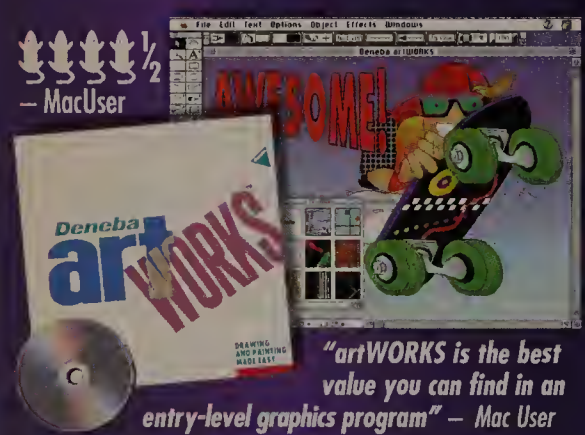

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DON SELLERS SHOWED A LACK OF respect for, a lack of knowledge of, or a prejudice against chiropractors when he stated that "sometimes the computer-savvy practitioner is not a physician at all, but a physical therapist or chiropractor, for example."

Please allow me to update your information. A physician/doctor is the only health-care provider who can legally diagnose and treat individuals. There are only three providers that can legally function in this manner: M.D.s, or medical doctors; D.O.s, doctors of osteopathy; and D.C.s, doctors of chiropractic. A chiropractor is a physician/doctor and is licensed in all states.

JAMES M. CLARK, D.C.
via the Internet

The mistaken distinction in the article was Macworld*'s fault—an error in editing—not Mr. Sellers'. Neither Mr. Sellers nor* Macworld *meant any disrespect to the profession.—Ed.*

One Man's Heaven . . .

I WAS FIRST STARTLED TO READ SOMEthing as literate as Ian Brown's "Death and Mourning on the Internet" (*Viewpoint*, June 1996). And then I was bothered by my surprise: Why shouldn't a computer magazine publish well-crafted, thought-provoking essays such as this one? Do your faithful readers a favor and publish more pieces that inspire us to pause, however momentarily, and reflect on a technology that is taking over our lives without giving us a chance to just sit and think about what it might mean.

PAUL ELDRENKAMP
Newton, Massachusetts

I WAS DISGUSTED READING IAN Brown's piece in the June issue. Such New Age trash is repulsive to those of us who have firm beliefs in life beyond E-mails, Web pages, and the digital icons of today's technoworld. Technology is not tied to the afterlife or to getting in touch with one's self, or affiliated with phantoms, ghosts, and other such drivel. Ian Brown says, "The Internet . . . [is] the closest thing to an afterlife that many of us may know. Maybe the Internet can become our heaven." What a sad commentary. My advice to Mr. Brown is to drop the electronic tarot cards and pick up a Bible—any number of fine translations are available on CD-ROM.

KEVIN L. HOOPER
North Olmsted, Ohio

I FEEL FOR IAN BROWN ON THE LOSS of his friend, but to immortalize his E-mail address is akin to bronzing his mailbox.

Communication via the Internet is wonderful, don't get me wrong. But to replace the personal interaction between two people is not heaven. Although I have heard people describe it as hell.

PETER ALDRICH
Wallingford, Connecticut

The Rebels Write Back

YOUR MAGAZINE IS, ON THE WHOLE, extremely well written and informative. However, there is a mistake in the *Star Wars* games review, which states that the rebels' signature craft is a TIE fighter (June 1996). I am sorry to report that the TIE fighter is *not* the rebels' signature craft, but the signature craft of the evil Empire. The X-Wing fighter is the most popular craft among the rebels, and Luke Skywalker's fighter of choice. The TIE fighter is the symbol of all that is evil and malicious in the galaxy. Please do not mislead your readers who might not know this fact. The *Star Wars* galaxy forgives you.

DAVE NIGRO
Freehold, New Jersey

We were further educated by reader Dan Moren of Newton, Massachusetts, who pointed out that the TIE (Twin Ion Engine) fighter is an Imperial signature craft, and that the rebels' signature craft is also known as the Incom T-65 Space Superiority Fighter—X-Wing to us laypeople. What can we say? We've been spending entirely too much time on this backwater planet.—Ed. m

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Mark Hall
Editor in Chief
Macweek
July 24, 1995

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Keith Boncek
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August, 1995

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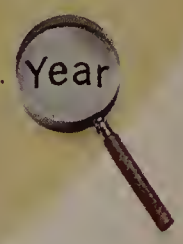

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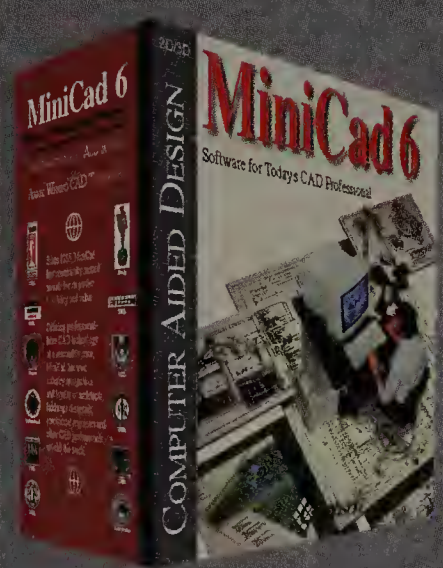

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State of the Mac

by Adrian Mello

Being Part of the Family of Mac

YOU KNOW YOU BELONG—DO YOU KNOW WHY THAT MATTERS?

SPEND MUCH TIME around the Mac community and you come to recognize something about us. Hard to put your finger on it, but you know it's there—a certain ineffable character you can see in Macintosh users and Mac product developers, and in the Macintosh itself. We differ in many respects from one another, but we also share something very basic. More than simply an affinity for a particular personal computer, we share a community of values—an independent, inquiring turn of mind; appreciation for creativity and innovation; a taste for exploration; a regard for excellence in design and execution; and enthusiasm for technology, to name just a few. Like members of a select society, Mac people recognize each other when we meet, almost as if there were a secret handshake.

Yet we rarely stop to consider how important the persistence of the Mac community, the Macintosh spirit, is—not simply to the survival of Apple Computer but to the state of personal computing and the Internet. If that sounds like an overstatement to you, consider this. The very qualities that have made the Mac's technology superior (and that make Macintosh users a breed apart) are those the computer industry requires to meet the needs of the future.

Passionate, Original, Demanding

Our readers are fiercely passionate about the Mac and unlikely to show any quarter when it comes to alternatives—like most Mac customers. According to a study by Computer Intelligence InfoCorp, seven out of eight Macintosh users who purchased a new computer in 1995 chose another Mac. In both 1994 and 1995, Apple came in first in repurchase loyalty with an 87 percent repurchase rate—ahead of Dell Computer at 74 percent, Hewlett-Packard at 72 percent, Acer at 68 percent, and Gateway 2000 at 66 percent.

Our readers are well aware of the threat Windows 95 poses, and yet undaunted. In response to "The New Windows Threat" (February 1995), which argued that Windows had pushed ahead while "the Mac interface of today bears a very strong resemblance to that of a decade ago," one reader wrote back, "Maybe the Mac OS was just done correctly from the beginning." "Who cares if the Mac only has a 10 percent market share as long as it's the best 10 percent?" another asked recently. Perhaps the Mac is not so much for the rest of us as it is for the *best* of us. No one wants to be labeled an elitist, but let's be honest: don't you think twice about people when you find out that they prefer using a PC? I do.

Our individualistic compatriots in the Mac community enthusiastically embrace new approaches as long as they offer improvement—even small ones. A letter we published in May 1995 illustrates that freethinking nature. "Almost every piece of software now on the market can draw round-cornered rectangles. But gee, that's a mouthful. We can do better. I suggest *obloid* for the following reasons: (1) it's a portmanteau word suggestive of *oblong* and *ovoid;* (2) it has the same number of letters as *square* and *circle;* (3) it isn't being used for anything else; and (4) as far as I can tell, nobody owns it."

It's no surprise that the Mac is still the best place to find exciting new technology. Mac customers try and buy more new products than PC users—30 percent more, according to a September 1995 International Data Corporation report. And developers often tell me how they appreciate the willingness of Mac customers to consider innovative products.

Our readers are a hard bunch to please. Not only do they require us to get the big picture right, they let us know about our every slip. OK, so once in a blue moon we blow it big. For first-hand proof, check out this issue's *Letters* column to see how one of our readers rightly slaps our wrist for confusing a *Star Wars* TIE fighter with an X-Wing.

Another reader says we're too critical: "You guys at *Macworld* are a lot better than a certain other magazine when it comes to reviews. But what bothers me is your unwillingness to shell out that fifth star." Yes, we are stingy with that fifth star, but our readers hold Mac products to a high standard and they expect *Macworld* to do the same.

Passion, plus the desire for innovation, plus attention to detail, combined mean that nothing less than boldness will satisfy a Macintosh person. Our readers don't just admire innovation, they demand it. Shortly after the Power Macs were introduced, a reader wrote to complain about the packaging of the Power Macs. "We have a new level of computing power placed inside the same old, boring, and unfashionable case. The Power-

continues

HANK OSUNA

Book didn't become one of the most popular portables because it looked like its competitors. Can Apple put a little more effort into the external design of its computers? The benefits we could gain may be well worth the effort."

We at *Macworld* also want Apple to delight us once more with bold product designs. That's the origin of our own design for what a Mac should be a year from now. "The Mac Reborn" offers our vision of next year's Mac, combining the most interesting, yet practical, features and technologies we could think of. Our collaboration with Frogdesign yielded bold new designs for a Power Mac and PowerBook that are not only visually provocative, but offer functional advantages.

The Macintosh Community

Macworld serves the Mac community each month by uncovering new product directions, pointing to the best buys, and disclosing new techniques for mastering your Mac. But we wanted to do more, so we've added new ways to provide even better service for our readers. Macworld Online provides an electronic lifeline for the Mac community. We post news daily so you can follow late-breaking developments and keep pace with the technological innovations in the Mac market. Macworld Online is also a terrific source for great Mac shareware, useful tips, Internet information, and a virtual library of back issues. After years of communicating to readers through our print magazine, I can now experience an immediacy and dialogue with readers that never ceases to amaze me. Stay tuned for more exciting developments at *www.macworld.com*.

To even further reinforce the Macintosh community, this month we are introducing the Macworld Club to provide a new forum for people passionate about the Mac. The Macworld Club will help loyal Macintosh users share information, exchange ideas, receive buying advice, and learn how to get the most out of their Macs. To make it that much easier to own and use a Mac, a range of new services is available to Macworld Club members, including discounts on *Macworld* magazine and Macworld Books, access to special forums on Macworld Online, free admission to local Macworld Club events, and other benefits made possible by *Macworld*'s far-reaching connections with Macintosh product developers, industry experts, and Macintosh user groups.

Stand Up and Speak Your Mind

I can't imagine computing without the Mac, and that's why it's important to me that *Macworld* find new ways to strengthen the Mac at its very foundation—its loyal users. Every so often I've asked our readers for help in learning where they stand on various issues. I've been overwhelmed by the response I've received, with a range of viewpoints as varied as our readers themselves. This wealth of ideas and viewpoints has contributed to making *Macworld* a better product. I ask for your help once again. Macworld Club is the logical extension of *Macworld*'s long relationship with the Mac community. I hope you will read the letter enclosed with this issue, join the club, and write to me at *amello@macworld.com* with your ideas on how we can serve you even better. Together we can build a stronger Mac community that will help us all continue to stand as a breed apart. m

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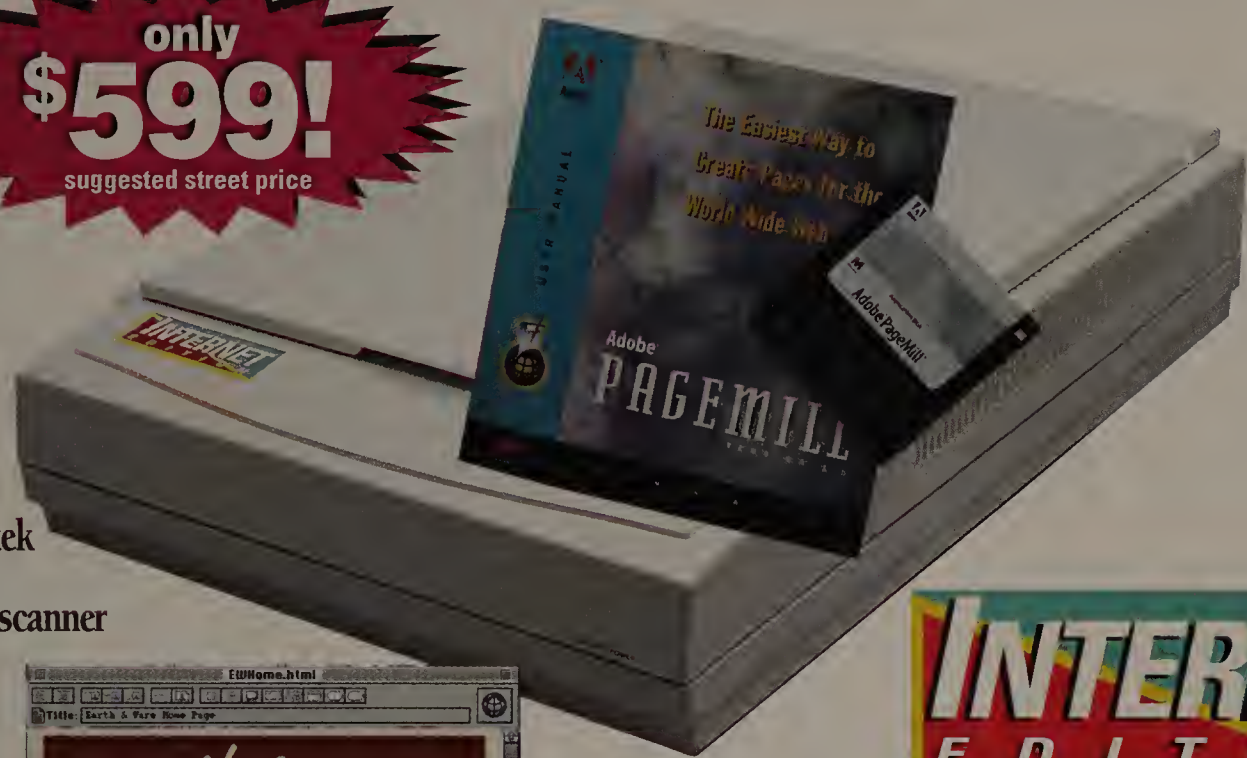

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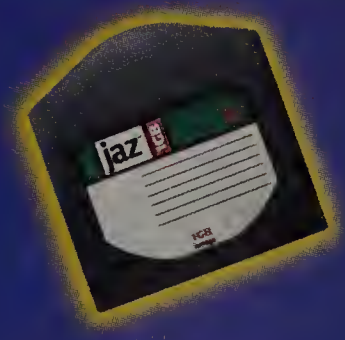

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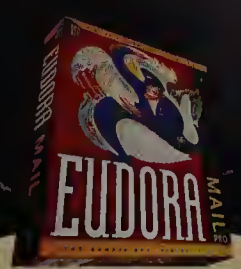

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The Desktop Critic

by David Pogue

1996 Desktop Critic Interface Awards

THE BEST AND WORST PUSHES ON THE HUMAN-INTERFACE ENVELOPE, PLEASE

IN 1984, REAMS WERE WRITten about the superiority of the Mac's interface. Connoisseurs raved about the drop-down menus, the overlapping windows, the Trash Can. And because most software companies respected Apple's conventions, a great consistency reigned throughout the land. But since then, small cracks have appeared in the dike of standardization: here and there, software companies have dreamed up interface elements that were never part of Apple's original design. Some elements, like hierarchical menus, were such hits that today we take them for granted.

In the coming months, Apple will be designing the first major System overhaul in years—Mac OS 8 (Copland). Human interface will become a hot topic once again. In anticipation of this event, allow me to present the first annual Desktop Critic Interface Awards, to encourage software designers to push efficiency, intelligence, and fun to the forefront, and to shelve interface elements that are frustrating, wasteful, and dumb.

Print One Copy

The dialog box that appears when you choose the typical Print command is an utter waste of time. It asks how many copies you want, and which pages you want to print. Well, it so happens that 99 percent of us, 99 percent of the time, want *one* copy of all pages. Every time we print, we slap the return key and ignore the box, which is confusing to beginners and a bore to everyone else.

That's why the Print One Copy command, as found in SimpleText, is pure elegance. You choose it, you get a printout—no dialog box necessary. C'mon, programmers. How long would it take you to implement this in your software . . . four minutes? The Print One Copy command shines because it correctly anticipates what we'll want to do most of the time, instead of making us slog through a redundant interface designed to handle the occasional exception.

Tip of the Day

Today's Microsoft programs are bloated, slow, and encumbered by features we'll never use. That's bad interface design.

However, the designers have taken a baby step in the right direction by inventing the Tip of the Day. This window explains one single feature of the program. Frankly, one Microsoft feature a day is about all the average person can take, and this gizmo presents them in a controlled, digestible format. Now and then, believe it or not, the tips even display a teeny, tiny hint of humor ("It's never too late to learn to play the piano"). Fortunately, the tip-a-day phenomenon is spreading to other programs, including the Extensis plug-ins series.

JENNIFER JESSEE

Phone Number in About Box

It seems like a no-brainer: put the software company's phone number in the About box (under the Apple menu). Yet BBEdit (Bare Bones Software), Finale (Coda), and America Online are among the few whose programmers had the guts.

Sounds for Positive Feedback

Why is it that computers make sounds only when we're doing something wrong? Click in the wrong place, and the Mac beeps. Pity the poor Mac user in a crowded office—the Mac may as well blurt out "Wrong, stupid!" over the PA system.

However, programs that play sounds when things are going *right* are addictive, pleasurable, and incredibly satisfying. Pressing ⌘-shift-3 to capture your screen image makes a crunchy camera-shutter sound. The Launcher makes a satisfying click when you click on it. WindowShade plays a brisk little *whit!* sound when you collapse or expand a window. Show me someone who isn't positively captivated by any of these programs, and I'll show you someone who needs a hearing aid.

Dialog Box Tabs

Dialog boxes aren't by themselves a terrific interface. A feature that requires you to type numbers into a dialog box is always worse than accomplishing the same task by direct manipulation.

If we must endure dialog boxes, at least the new tab interface is a great step forward. Each time you click on a tab, the dialog box presents another pane of options, without your having to open a different dialog box. You'll find these clever items in Claris Emailer, recent Microsoft programs, and elsewhere. The tabbed dialog box succeeds because it hides clutter from you—but makes the other options immediately accessible.

Making panes right requires taking pains, however. The OK and Cancel but-

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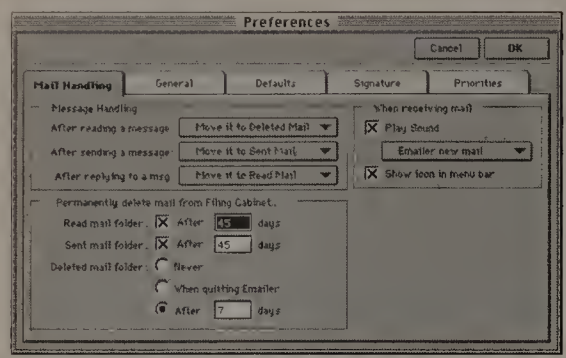


Dialog Box Tabs

tons should go *outside* the changing area of the box, not within the pane; otherwise, it's not clear whether we're OKing the whole box, or just one pane. (Claris did it right in "Dialog Box Tabs"; Microsoft does it wrong.) Second, stacked tabs, as in Word 6's Options dialog box (12 tabs in one box!), don't work; you click on a tab, and it jumps away from the cursor to a different position—hardly what the hapless user expects.

Stretchy Calendar Banners

Stretchy Calendar Banners

Now Up-to-Date has always been a model of direct-manipulation excellence. Wanna reschedule lunch? Point to it and drag it to a new calendar square. Wanna put a little party-hat graphic on your birthday? Drag it from the palette of pix onto the appropriate square.

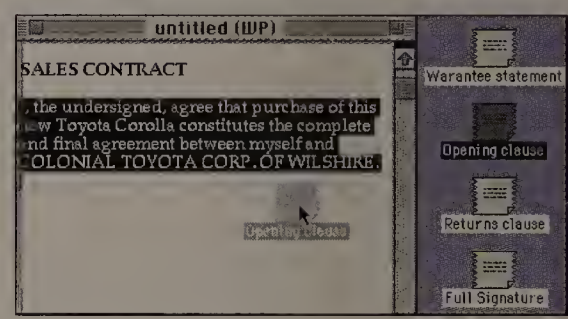
The real genius, though, is the latest development in banners (strips that lie across an entire week, saying, for example, "Vacation in Buffalo"). Beginning in version 3.5, you can drag diagonally to make a banner stretch into a different week. The endearing little ripped-apart ends immediately communicate what's happening. It's a rare first-time Up-to-Date user who doesn't go banner crazy, drawing them all over the screen, just for the fun of it. Talk about having a banner year.

Automatic Unstuffing

When you download a file from America Online or CompuServe, what you actually get is a compressed StuffIt file. But instead of making you unstuff your downloaded goodies manually, the America Online and MacCIM programs do the job for you, automatically, when you sign off. As with the Print One Copy command, the software accurately anticipates what almost everybody will want to do. Not artificial intelligence—real intelligence.

Macintosh Drag and Drop

If a good interface is defined by direct manipulation, fun, and efficiency, the Interface Improvement of the Year is System 7.5's Macintosh Drag and Drop. If you're not using D&D, you're missing a great thing. It works only in certain programs, but the number is growing. (Current examples: ClarisWorks, FileMaker, WordPerfect, Emailer, InfoGenie, SimpleText, and the System 7.5 desk accessories.) In a D&D-savvy program, you



Macintosh Drag and Drop

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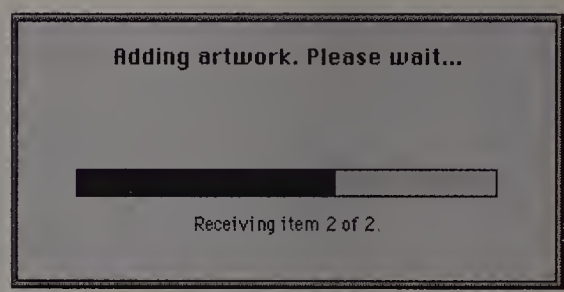
can drag highlighted text or graphics directly from one document into another document, or into another program's document, or even onto the desktop, where it becomes a clipping file. Later, you can drag that clipping file right back into a D&D-savvy program; in effect, your desktop serves as a system-wide, PageMaker-like pasteboard!

Furthermore, option-dragging makes a duplicate of the highlighted text or graphics; double-clicking on a clipping file opens it instantly in the Finder; it's all just too much happiness, and it makes cut and paste look positively antique.

The Worst of the Year

I figured it'd be too much of a downer to dwell on some of the *bad* interface ideas, but they shouldn't go unmentioned. Chief among these Worst Interface Developments of the Year is Word 6's New command—instead of producing a blank, untitled window, it makes a dialog box of templates appear, violating the screaming logic that 99 percent of the time you're *not* about to create a Thesis, Weekly Time Sheet, or Brochure 1. Apple isn't perfect, either: I've always felt that dragging a floppy to the Trash to eject it is a terrible interface infraction—it scares the bejeezus out of beginners, and doesn't make any logical sense (although I'm at a loss to propose a better solution).

The worst interface idea of the year has got to be America Online's art-downloading mechanism. You're happily exploring away, when your screen gets hijacked, for several long, expensive minutes, by a dialog box *with no Cancel button!* (AOL vows to eliminate this horror in 3.0.) The frustration you feel is akin to being in a locked cab hurtling in the wrong direction with a driver who speaks no English. (You can fight back with the shareware masterpiece ArtValve, available through America Online, keyword *Macworld*, and through Macworld Online.)



The Worst of the Year

Why doesn't somebody market a monthly CD-ROM that contains the complete America Online art database? Each month, you'd copy this whopping Online Art file into your America Online folder and rid yourself of that "Please wait" screen forever. Now *that's* an interface idea I'd pay for.

The Upshot

Time and again, superior interface design boils down to three principles. (1) Fun is better than no fun, even in business software (sounds, tabs, daily tips). (2) Let me manipulate on-screen objects myself (drag and drop, banners). (3) Do obvious tasks for me (auto-unstuff, Print One Copy).

May all programmers embrace these points and strive for ever-better designs. After all, the better the software interface, the sooner we can get out and do some human interfacing of our own. m

Contributing editor DAVID POGUE is a former software-design consultant. He wrote the Macintosh techno-thriller novel, *Hard Drive* (Ace, 1996).

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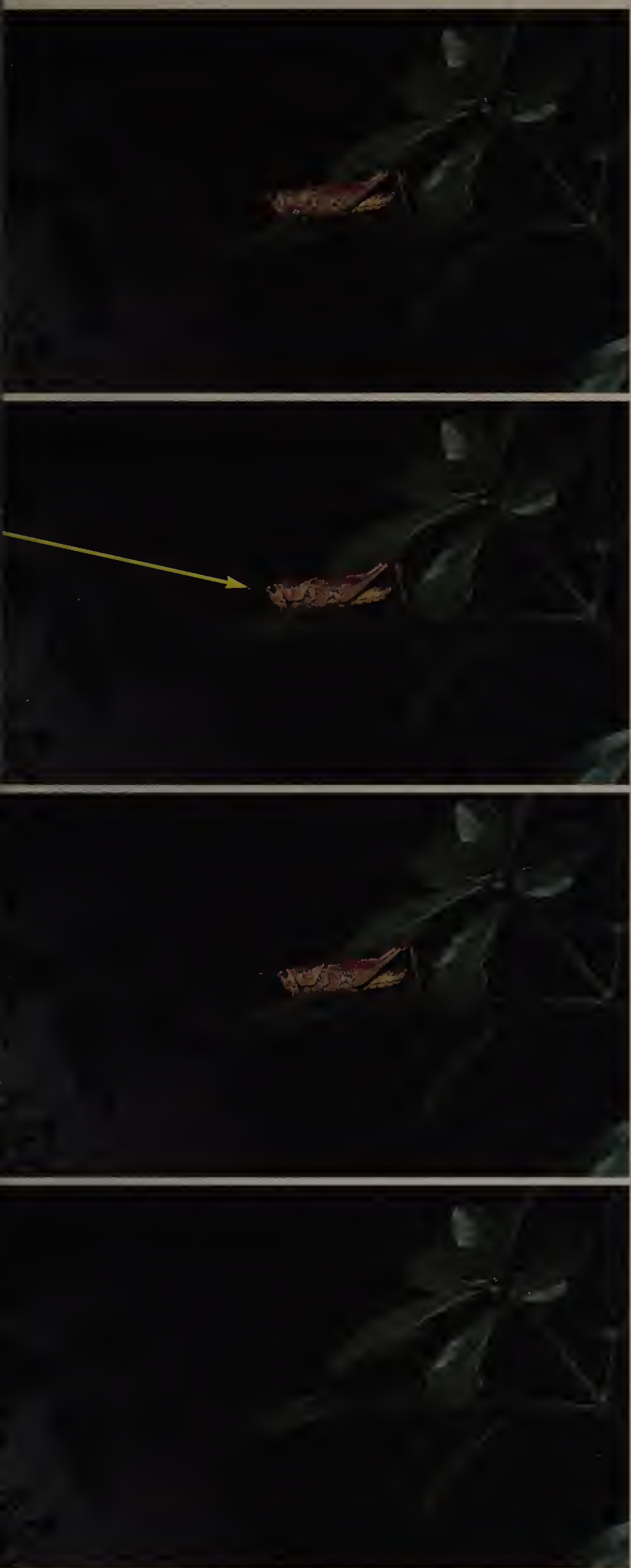

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News

MACWORLD EXCLUSIVE

Power Computing Widens the Gap

NEW TOWER BOASTS FIRST POWERPC 604E AT UP TO 225MHZ

by Galen Gruman

KEVIN CANDLAND

Hang on to your hat. Three months after introducing the first Power Mac running at 180MHz, Power Computing (512/388-6886, *http://www.powercc.com*) has again upped the ante. Now, it's the first company to offer Macs based on the new PowerPC 604e CPU, which is faster, megahertz for megahertz, than the plain 604 (see "The PowerPC's New Heights," *News*, July 1996). The new PowerTower Pro sports the 604e processor and six PCI slots, at $4195 for the base 180MHz version, $4495 for the base 200MHz version, and $4995 for the base 225MHz version. Yes, 225MHz—faster than any Pentium or Pentium Pro.

When I looked at the 180MHz PowerTower a few months back, I could feel the speed difference (see "The New Speed Champs," July 1996). I can feel it again, and Macworld Lab results confirm that feeling (see the benchmark, "New PowerTower Pro Redefines Speed").

Power Computing is keeping its original PowerTower series, although the prices have dropped to under $4000. And you can expect the speeds of those three-slot systems to increase in the coming months, as will the speeds of Power Computing's PowerCenter desktop series. In fact, it's likely that Power Computing will have an even faster model of the PowerTower Pro later this year.

To keep the 604e humming, all PowerTower Pros come with a 1MB cache. Before 604e, all most people needed was 256K, and 512K sufficed for almost everyone else (programmers still needed 1MB). No more—because the CPU runs so much faster than the PowerTower Pro's bus, it needs a larger cache to keep the CPU from idling.

The PowerTower Pro's system bus is slower than that of the PowerTower: a 225MHz CPU has a system bus running at 45MHz, a 200MHz CPU's bus runs at 50MHz, and a 180MHz CPU's bus runs at 51.43MHz. The PowerTower 180's bus ran at 60MHz.

The reason is the architecture. Like the discontinued PowerWave series, the PowerTower Pro is based on Apple's

Tsunami architecture, used in Apple's Power Mac 9500. That system's bus was designed to run at 50MHz, and there's little tolerance for more.

The PowerTower Pro, like the PowerCenter series, uses Apple's Catalyst architecture, which is used in Apple's 7200. Also designed for 50MHz, it is more tolerant of being stretched, and Power Computing got it up to 60MHz.

A higher bus speed lets the CPU do more, so a 180MHz CPU on a 60MHz bus will run faster than the same CPU on a 51.43MHz bus. But Power

continues on page 50

online

Commercial Services Plan for Future

PROPRIETARY CLIENT OR INTERNET-BASED ACCESS?

by Cameron Crotty

The definition of what it means to be an online service is changing. While proprietary client software used to be standard operating procedure, several companies are looking to base their services on Internet technologies as a way to become more competitive.

New Dreams for GEnie It's been many months since anyone talked about GEnie as a major contender in the online wars, and the service has undergone a change in ownership and mission. Yovelle Renaissance, a venture-capital firm, purchased GEnie from General Electric in January.

New president Geoffrey Rochwarger is launching a new service, GEnie Interactive, in partnership with IDT, an Internet service provider. Whereas the GEnie Information Service was a text-only service restricted to direct-dial users, GEnie Interactive will be a multimedia service based on the latest in Internet technology. Anyone with an Internet account will be able to subscribe—the latter a strategy that all major online services are embracing. The subscription will cost $10 per month.

Prodigy Follows Suit Prodigy is undergoing its own transformation. As this article was going to press, Prodigy's management and a company called International Wireless were expecting federal approval on a deal to purchase the service from IBM and Sears, the partnership that founded Prodigy with CBS in 1984. "Long-term, the days of the proprietary client are over," says Prodigy communications manager Mike Darcy. Prodigy will be moving its entire service to Internet standard technologies, and plans to roll out the revamped service by the end of this year.

CompuServe Client's Slow Exit CompuServe has announced that future development on all CompuServe services—including the main CompuServe Information Service (CIS), its novice-oriented service, Wow (currently PC-only), and its corporate information services—will be based on nonproprietary technologies. Still, CompuServe subscribers should expect to see a proprietary client well into 1997. Current technological realities make it nearly impossible to deliver core online services, such as message boards and chat rooms, over Internet protocols with the same ease of use and reliability permitted by proprietary systems.

AOL Sticks to Its Guns America Online's vice president of product marketing, David Gang, couldn't agree more. "The Web," he says, "is not suited to a consumer online experience." Not surprisingly, America Online, the current leader in terms of subscribers, is sticking to its proprietary guns. "By going to open standards, [other services] are saying that technology is not a competitive advantage. We believe that technology is a competitive advantage."

AOL is striking deals with Internet service providers like AT&T to reach the growing number of users accessing the Internet through generic providers, but those subscribers will still need to have the AOL client to access the service. On the product side, AOL expects to ship version 3.0 of the Macintosh client by the end of August, and at press time announced it is rolling support for Macromedia's Shockwave technology into the client.

Other online services are not surprised by AOL's adherence to the proprietary client. "AOL has the most to lose right now, because they did the best under the old rules," says Prodigy's Darcy. Whether users will tolerate multiple clients in the long run is an open question, but for now the story is a familiar one. The current market leader pushes the status quo, while the rest of the pack scrambles and gambles on new technology, hoping that breaking new ground will let them claim a larger part of the territory as their own.

JOHN BLECK

systems

Macs Lose Starring Role

SPECIAL-EFFECTS PRODUCERS PREFER WINDOWS NT

by Stephen Beale

Among Hollywood's special-effects wizards, the Macintosh has long played an important supporting role as a low-cost alternative to Silicon Graphics and Sun workstations. It's a role that could become much larger given the promise of QuickDraw 3D and Mac OS 8. But like a movie villain who appears when you least expect it, Windows NT is making a strong bid to dominate a market segment Apple could have had to itself.

While Macintosh applications like Adobe After Effects and Photoshop have been popular tools for many kinds of postproduction work, 3-D imaging has largely been the domain of Unix workstations. With the introduction of the Power Mac and, later, QuickDraw 3D, Apple had reasonable prospects for moving the Mac further into the 3-D realm. However, Windows NT has proved to be a substantial roadblock, thanks to features that lend themselves to intensive rendering and animation projects.

Windows NT "is a much more mature operating system," says Matt Hoffman of Electric Image, developer of high-end Mac-based animation software. "It has real virtual memory, protected memory that people are used to seeing in Unix. It's a much smaller leap for people to make."

continues

Many of these features are promised in Mac OS 8, which is due for release in mid-1997. A forthcoming upgrade of Apple's QuickDraw 3D system software could also help close the NT gap.

But in the meantime, NT has made its move. Within the past year, two important 3-D

JOHN BLECK

applications, Microsoft Softimage and NewTek LightWave 3D, have been ported to the Microsoft operating system. Special-effects producers have followed, attracted by the relatively low cost of DEC Alpha and Pentium workstations.

"If Apple has anything to worry about in the entertainment industry, it's the DEC Alpha," says Dan DiPaola, former head of Los Angeles–based Fractal Design's Entertainment Technology Center, which closed this past May. "For $15,000 you're getting a pretty beefy machine. A lot of episodic and network TV stuff is being done with DEC Alphas."

Macs Relegated to 2-D One example of Apple's difficulties can be seen at Available Light, a special-effects producer that opened a Mac-only digital division in 1994. Today, the studio uses LightWave 3D on DEC and Pentium workstations for all its 3-D rendering. Macintosh hardware is used strictly for less-intensive 2-D graphics work, running After Effects and Photoshop.

"Windows NT is multitasking and multiprocessing," says Larry Stanton, who supervises the digital systems at Available Light. "You can literally be rendering and at the same time be touching up frames in Photoshop. My people are much more productive on the NT platform."

Windows NT has also found a home at Digital Domain, one of the largest special-effects producers. In contrast to Available Light, which turned to NT as an alternative to the Mac, Digital Domain sees NT primarily as an alternative to Unix. "It's considerably cheaper," says spokesperson Bob Hoffman.

John Alfano, Apple's product manager for QuickDraw 3D, acknowledges that Windows NT has made inroads in the entertainment industry. But he contends that it is largely coming at the expense of Unix, not the Macintosh.

Alfano also points to the availability of Softimage for Windows NT as a factor behind NT's success, something that was to be expected given Microsoft's 1994 acquisition of Softimage. NewTek has announced a Macintosh version of LightWave 3D, but few are holding their breath for a similar announcement from Microsoft.

Saved by QuickDraw 3D A happy ending could be in sight. At Warner Bros. Studios, a team of 3-D artists is using Strata StudioPro on a Power Mac to create 3-D models of Bugs Bunny, Porky Pig, and other Looney Tunes cartoon characters—a massive project that once would have been unthinkable on anything but a Unix workstation.

That's one of the promises of Apple's QuickDraw 3D upgrade. Electric Image's Hoffman says the upgrade will include features requested by developers, particularly an improved memory-management scheme.

systems

Mac-Clone Development Accelerates

RAFT OF NEW CLONES EXPECTED IN 1997

by Charles Piller

At long last, Apple's oft-repeated intention to broadly license its operating system shows signs of momentum. A spate of recent licensees—most of which will use the forthcoming, industry-standard Common Hardware Reference Platform (CHRP)—should produce a range of Mac-compatibles that reach consumers early next year, as long as Apple completes the Mac OS for CHRP by then.

The most significant developments involve IBM. In May, Apple CEO Gilbert Amelio announced that Apple and IBM will jointly produce a new Mac OS–based notebook. And the two companies are rumored to have other joint projects waiting in the wings. Then, in early June, IBM announced the availability of its design for CHRP-based computers. It offered the specification at no charge to other computer makers, to jump-start industry interest in the new platform.

In late June, IBM demonstrated a prototype CHRP-based workstation running both the Mac OS and Windows NT at the PC Expo trade show. The machine featured 64MB of RAM (with 32MB required) and a 133MHz PowerPC 604 CPU.

Scheduled for availability by the end of the year, the system is designed for corporate IS managers in dual-platform environments.

To underscore IBM's com-

MACWORLD EXCLUSIVE

ROBERT PERRY

Umax Hits the Fast Lane

Power Computing is not the only Mac-clone manufacturer that will offer a system based on the speedy new PowerPC 604e CPU. Umax (510/226-6886, *http://www.supermac.com*) has introduced a 200MHz version of its SuperMac S900 system that will sport the same PowerPC processor. The system is expected to ship later this summer (see "New PowerTower Pro Redefines Speed").

mitment to the Mac OS, which the company licensed last spring for bundling with PowerPC CPUs (see "IBM Reveals Its Ambitious Mac Plans," *News*, July 1996), IBM recently established a Mac OS support center in Taiwan. Big Blue also named its first two sublicensees, system-board maker DTK and computer and consumer-electronics giant Tatung, both Taiwan-based companies. Each company showed IBM-design CHRP prototypes in June at the Computex trade show in Taiwan. Umax Computer also previewed a CHRP multi-operating-system prototype at Computex.

Motorola in Chinese Market Meanwhile, Motorola Computer Group—the other Mac OS licensee with permission to sublicense to other vendors—announced a joint venture with Nanjing Power Computing to make Mac clones in China later this year.

Motorola also named its first sublicensee—Taiwanese system-board maker Soyo Computer. Soyo quickly announced that it intends to ship inexpensive CHRP-based system boards to Mac-clone makers by the fall Comdex trade show, and to manufacture 40,000 boards per month by year's end.

Much faster versions of the 603 and 604 CPU families—boasting clock speeds reaching 200MHz and higher—are already in the hands of manufacturers. This should allow the anticipated burst of inexpensive CHRP Mac clones to compete well against Pentium-based products.

Pippin Moves Forward Apple is also busy pushing its other OS, Pippin, as a multimedia player and Internet-access platform, and trying to build consumer awareness of the game-player–size device in the United States. In May, Apple announced that Bandai would release its $600 Pippin device, dubbed @World, in the United States in the fall. Apple also announced a license for the Pippin architecture to Norwegian CD-ROM developer Katz Media AS for the European market.

Apple has positioned Pippin as its entry into the network computer sweepstakes—envisioned as a burgeoning consumer market based on simple, inexpensive devices designed for easy Internet access but with modest onboard computing power.

Apple Runs Windows NT Apple is also porting the Windows NT operating system to its network servers. Sources say the company has been showing NT running on its AIX server, which is commonly known as Shiner.

You can expect to see more Macintosh system choices in the next few months.

Additional reporting by STEPHEN BEALE and TOVA FLIEGEL.

display

Flat Panels Invade the Desktop

LCD TECHNOLOGY GOES BEYOND LAPTOPS

by Cary Lu

This is turning out to be a watershed year for flat-panel displays. For the first time, a flat panel is available to replace a CRT for nearly any application. LCDs have long been a staple of laptops, of course, but now you can actually buy a color LCD panel that replaces a two-page monitor. And for the truly adven-

continues on page 46

Media WATCH

BY JAMES A. MARTIN

Plug In, GIF Out A new package of Adobe Photoshop–compatible plug-ins, HVS WebFocus from Digital Frontiers (847/328-0880, *http://www.digfrontiers.com*), helps Web publishers reduce traffic jams on the Internet—without sacrificing image quality. The $129 package features HVS PhotoGIF, which reduces GIF files by as much as 70 percent and lets you create basic animations for Web pages using images in progressive GIF format. HVS PhotoGIF downsamples high-resolution 24-bit images to the Internet's 8-bit color GIF standard with minimal quality loss.

Images' Express Lane The old SyQuest/Federal Express route for speeding your graphics files to the prepress operator is another step closer to oblivion with the release of the DataShuttle, an ISDN adapter card from RNS (805/968-4262, *http://www.rns.com*) that is available in both PCI and NuBus versions. With the DataShuttle, you can send large graphics files over an ISDN line using RNS's bundled FileMover Pro software. The DataShuttle includes its own processor, which frees your Mac to continue working while the files are being transmitted in the background. The DataShuttle also works with 4-Sight's ISDN Manager and Luminous's Virtual Network, programs that simplify the transmission of large files over ISDN. You can also connect to BBS services like SoftArc's FirstClass and to remote computers using Apple Remote Access 2.1 (which supports ISDN) and Farallon Computing's Timbuktu 2.0 for Networks. The $995 DataShuttle 128 includes one ISDN port for transfer speeds of up to 128 KBps, while the $1395 DataShuttle 256 includes two ports for a combined speed of up to 256 KBps.

Web Video 101 Movie Cleaner Pro, from Terran Interactive (408/278-9025, *http://www.terran-int.com*), simplifies the sometimes befuddling act of compressing QuickTime files. Now, the program's first plug-in, Web Motion (also from Terran), walks you through the steps required to optimize QuickTime videos for playback on the Web. WebMotion's Web Expert interview process helps you make the best choices for frame rates and playback size. Along the way, you can preview how those decisions will affect video quality. Due in July, the $130 plug-in also includes filters for optimizing video at low data rates and automatically creates HTML tags for your videos.

JOHN BLECK

Special REPORT

A Change of Face in the Font World

ADOBE AND MICROSOFT MOVE FONT TECHNOLOGY FORWARD

After years of languishing in the publishing backwaters, font technology is about to enter the spotlight. Propelled by the rapid convergence of Web and print publishing, a new font format standard is being developed, while Adobe prepares to shake up the growing font utility market.

One Format For Print and Web Fonts

by Erfert Fenton

Adobe and Microsoft are collaborating on a new font format called OpenType. But don't panic: OpenType won't be a third contender that clashes with current formats—at least that's the word from Adobe and Microsoft. Instead, it will be a universal font format for printed output and online viewing. It will combine Adobe's Type 1 with Microsoft's TrueType Open, an extension to TrueType that adds to fonts in Windows typographic capabilities similar to those of GX fonts on the Mac.

The companies have agreed to cross-license their font technologies, and plan to make OpenType available to other developers. "Mac OS 8's OpenFont architecture will support OpenType, TrueType, or PostScript," says Carla Ow, Apple's product manager for Mac OS graphics technology.

Brian Heuckroth, Adobe's product manager for type, expects OpenType to propel "the World Wide Web Consortium and other standards bodies into supporting font tags that make documents look like they're supposed to on the Web."

What will the new format mean for publishers and service bureaus? Existing fonts will coexist peacefully with OpenType, says Microsoft's Alec Saunders. You'll just add OpenType fonts as they become available. Heuckroth claims you'll be able to display and print OpenType fonts using either a TrueType rasterizer built into the Mac OS or a PostScript rasterizer such as ATM.

But until OpenType is available, it's impossible to say whether the fonts will indeed work seamlessly with existing applications. (When Mac TrueType fonts debuted, they caused endless headaches for service bureaus.)

Reaction varies. Says typography expert Kathleen Tinkel, "OpenType probably won't have much of an effect on publishers; they'll cling to Type 1 as long as it's convenient to do so." More skeptical is Steve Beckerman of Design & Type, a prepress shop: "A new font format will create further confusion for customers," he says. "This is just something else that could cause a print job to blow up."

But Animated Design's Andréa Silvestri thinks OpenType may be a boon for Web designers. "If you want to use a [non-System] font, you have to make it a bitmap, which is time-consuming to create and takes forever to download," she says.

ATM Takes On Font Utilities

by Stephen Beale

Font-utility makers will soon find themselves competing with an 800-pound gorilla as Adobe Systems (415/641-4400, *http://www.adobe.com*) readies ATM Deluxe 4.0, which adds font-management functions to the type rasterizer that was the core of previous versions.

ATM Deluxe 4.0 is more than an upgrade to the software that brought scalable screen fonts to the Mac. Lurking behind the ATM facade is a new program that offers many features found in Symantec's Suitcase, Alsoft's MasterJuggler, and other font utilities.

The software lets you organize fonts into sets that you can activate or deactivate as needed. With Adobe Type Reunion Deluxe 2.0 installed, you can turn the sets on or off from any application's font menu. ATM Deluxe also incorporates the font-substitution functions found in SuperATM and Acrobat; if you open a document that uses uninstalled fonts, ATM generates a substitute that approximates the original. Also new are damaged-font diagnostics and antialiasing of on-screen type.

Adobe makes no apologies for taking on the smaller utility vendors, claiming that ATM offers automation advantages other font-management products can't. For example, it activates an installed font automatically if you open a document that includes it.

Scheduled to ship with 30 free typefaces by the fall, ATM will list for $100, but Adobe plans a 90-day $50 special along with an introductory $70 bundle that includes Adobe Type Reunion 2.0.

Until ATM Deluxe ships, no one knows how well it will perform. But other utility vendors must now contend with a drastically altered landscape. Rascal Software president Paul Sibek, whose font utility company publishes theTypeBook and theFONDler, acknowledges that Adobe will likely be a tough competitor. But he contends that smaller firms can bring new products to market more quickly than Adobe. He also believes Adobe may have what amounts to a conflict of interest since it is a type foundry in addition to a font-utility maker.

Adobe's recent acquisition of Ares Software, maker of FontChameleon and FontMonger, has further shaken the market. Adobe will offer FontChameleon's compression technology to manufacturers of PostScript printers but won't sell FontChameleon as a stand-alone product. Plus it will support FontMonger for only a year.

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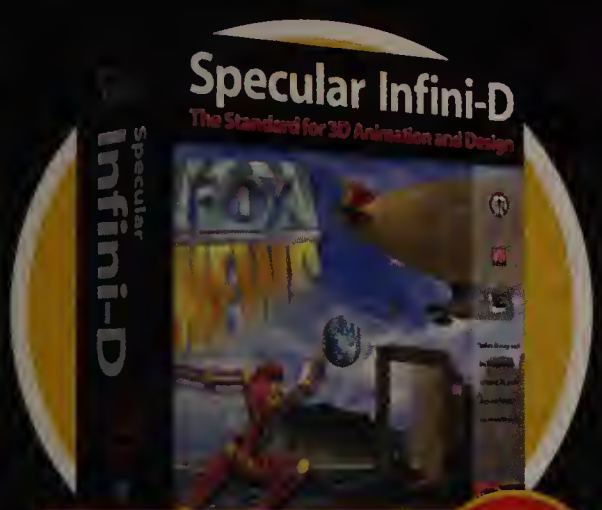

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Circle 41 on reader service card

continued from page 43

turous, there's even a large, flat television set you can hang on your wall. LCD technology is moving so fast that the 9.4-inch–diagonal, 640-by-480-pixel color LCD that was the standard only 18 months ago is almost out of production, superseded by larger ones. Likewise, 10.4- and 11.3-inch panels are heading for early retirement in favor of 12.1-inch models that offer 800-by-600-pixel resolution.

Premium laptops this fall will sport a 13-inch display, the largest size practical for mass-production laptops; anything larger would be wider than the keyboard.

A Less-Than-Perfect View Larger LCDs—up to 17-inch–diagonal displaying 1024 by 768 or 1280 by 1024 pixels—are destined for the desktop. But their size presents problems for the traditional active matrix technology that worked so well on smaller screens. No matter how you position your head vertically, you'll see an optimum view of only part of the display (the horizontal viewing position is not as restricted). A new "super" active matrix design will be available by year's end that overcomes this limitation, improving the vertical viewing angle from 40 degrees to over 100 degrees—enough for unrestricted viewing.

Although tonal range on LCDs has improved, it's still well below a CRT's standards. You'll see claims of up to 262,000 colors for some of these panels, but they're actually capable of showing fewer than the 32,000 colors possible on a 16-bit CRT screen. On the positive side, the LCD's flat structure means you won't get the screen distortion common on CRTs, and an LCD takes up far less space and uses much less power than a CRT.

A New Breed of Display To compensate for LCDs' difficulty in handling fast motion and tonal range, the first successful large, flat television screens are using plasma displays. Fujitsu now has 21- and 42-inch plasma displays available for $6000 to $9000. Sony has a hybrid screen with LCD addressing on the front and plasma on the back; a 25-inch model should start production at the end of the year.

All these very large screens can show computer images, but only at 480 pixels vertically; they are intended mainly for television images. Fujitsu expects to have plasma displays with 1024 vertical pixels in 1998, including a 55-inch model.

Large LCD displays can expect competition from a new breed of micromirror projectors made by Texas Instruments (see "Mirror, Mirror on the Wall," *News*, March 1996). Because they use optics, the TI projectors cannot be made in a thin package, but they do produce excellent image quality and are likely to cost much less than LCDs.

A High Premium Today's flat panels still command a hefty premium—roughly six to eight times the cost of an equivalent CRT; for example, a 17-inch LCD would set you back a staggering $6000. So people aren't exactly lining up to buy them. Some flat-panel companies think desktop flat panels will start taking off when the cost premium drops to three times the cost of a CRT, but others don't expect to see mass-market sales until the premium falls below one and a half times.

Although expensive compared with CRTs, active matrix displays are now priced low enough to undercut development of some competing display technologies, such as field emission displays (FED). Several companies have already abandoned work on FEDs, which perform like thousands of tiny CRTs and promise some advantages over active matrix, such as the ability to produce higher brightness levels with lower power consumption.

How soon are we likely to replace our desktop monitors with large LCD panels? CRTs won't become extinct in the next few years, but it may not be too soon to put them on the endangered species list.

High-Res Projection in a Small Box

SUPPORTS RESOLUTIONS UP TO 1280 BY 1024 PIXELS

High-quality projection systems have typically been large, cumbersome affairs that required a lengthy distance between lens and screen for a well-focused image. Not anymore. The DP9100 from Proxima (619/457-5500, *http://www.prxm.com*) provides large (up to 1280 by 1024 pixels), high-resolution images in a lightweight, compact box—about half the size of its closest competitor. And it provides a much lower ratio of image size to distance from screen—6 to 7 feet for a 4-foot image.

Like the DP4100, its low-end predecessor, the $17,000 DP9100 supports Adobe's MediaExpress floppy drive ($2000; $2500 including a 540MB hard drive), which makes a computer hookup unnecessary. Also providing 24-bit color display at up to 1280 by 1024 pixels is the $8500 Proxima Ovation+ 944 active matrix LCD panel. —CATHY ABES

ROBERT PERRY

entertainment

Network Play Is Where the Action Is

BUT MAC MISSIONS ARE NOT YET ON COURSE

by Cameron Crotty

Solitaire's days are numbered. This year's hot gaming ticket is networked multiplayer action, and in the months to come, the competition won't end at the local-area firewall.

While many games now offer network play, most require a LAN or a direct modem connection between two machines. But wide-area network gaming services are gearing up to create connections among distant gamers.

Performance Constraints Time is the enemy if you're running a game network—specifically, the time it takes for a packet to travel from one gamers' machine to another's, known as latency. Conventional network game wisdom states that to run any sort of real-

time action game you need latencies of 100 to 150 milliseconds, with shorter times always better. After the game's content, a network game service is defined by how it delivers the action, either forcing

players to dial directly into a private network or allowing access through an Internet client.

Connecting with Internet Services Ten (*http://www.ten.net*) and Mpath (*http://www.mpath.com*) have linked up with Internet service providers—Concentric Network and PSI, respectively—to offer their services over the Internet. Dwango (*http://www.dwango.com*) says it is working on an Internet client, but it currently requires gamers to dial directly into its network, which increases game speeds but limits geographic reach.

Traditional online services are scrambling to network games. America Online has created an entire section dedicated to network gaming (keyword: *Games*) and has said it will soon offer Kesmai's Air Warrior, a flight simulator until now available only on CompuServe; a Mac version is expected later this year.

Macintosh Drags Its Feet As usual, the Mac game scene lags behind the PC market. Ironically, one of the first network game services, Outland (*http://www.outland.com*), is Mac-only, but it can handle only turn-based games like chess and Delta Tao's Spaceward Ho. Most of the up-and-coming network game services are focusing on the PC first. Dwango and Ten both promise Mac clients later this year, and Apple is tweaking its recently announced network GameSprockets to make Mac support a no-brainer (see "New API to Woo Game Developers," *News*, July 1996).

In the meantime, Mac gamers should check out ICI's Warbirds (*http://www.icigames.com*), an Internet-based flight simulator. Pricing for networked games is still settling out but looks to be in the $1.50- to $2-per-hour range. Eventually, many services hope to use revenue from advertising to eliminate game fees, but for now it's definitely pay while you play.

storage

Igniting the Desktop

FIREWIRE INTERFACE TO SPEED PERIPHERAL PERFORMANCE

by Howard Baldwin

Apple's high-speed Firewire serial interface for Macintosh peripherals is picking up steam. By early next year, owners of PCI-based Macs will be able to purchase Firewire cards from Adaptec (408/945-8600, *http://www.adaptec.com*).

One version will target high-end video-editing professionals and is likely to bundle software such as QuickTime drivers and Adobe Premiere plug-ins. The other will target a broader audience, with drivers for printers, scanners, and digital cameras. Although pricing has not yet been determined, Adaptec estimates the cards will cost about the same as high-end SCSI cards,

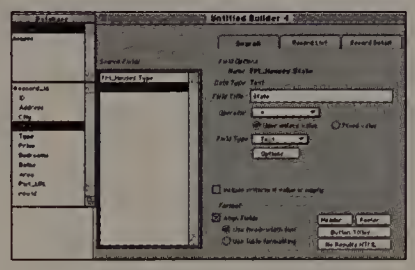
continues

Internet WATCH

BY CAMERON CROTTY

FM Pro Learns to Tango

Does your Web site say "Fresh!" when you open it? It had better, because four out of five Web surfers demand frequently changing and dynamic content generated on the fly from a database. Until recently the Mac's favorite data juggler, Claris FileMaker Pro, depended on AppleScript-based CGIs to connect to Web servers, but EveryWare (905/819-1173, *http://www.everyware.com*) will soon release Tango for FileMaker Pro, comprising a fast WebStar CGI and an editor for quickly assembling query pages and hooking them back into your data tables. Tango for FileMaker Pro is expected to retail for about $350, and EveryWare expects to include FileMaker Pro compatibility in the next general release of Tango later this year.

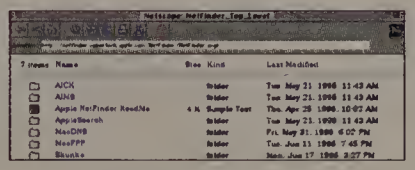


With Tango, your Web server can dance with your FileMaker Pro database.

Apple Finds the Web

Apple (408/996-1010, *http://www.info.apple.com*) has been busy whipping up its own Web-server attachments. Apple e.g. has been released in a beta version; when installed on a Web server, it uses the company's V-Twin technology to search the contents of a site and deliver relevancy-ranked results.

Working to bring the Finder's ease of use to the Internet, Apple's NetFinder is a CGI for Quarterdeck's WebStar Web-server software that serves up file directories as HTML pages. NetFinder lists the files with icons, names, sizes, and dates last modified, all in familiar Finder-like columns. Users can sort the files by clicking on a hot link at the top of each column. Clicking on an icon or file name either drills down into the folder or downloads the file as appropriate. You can download both NetFinder and Apple e.g. from *http://cybertech.apple.com*.



Apple's NetFinder CGI brings a little bit of the Macintosh Finder to the Internet.

E-Mail to the World

Everybody and his brother is making a mail server these days—far be it from Apple to skip the party. Its Claris subsidiary's (408/987-7000, *http://www.claris.com*) $299 OfficeMail package consists of SMTP mail-server software; a five-user pack of Claris EMailer; and ClarisLink, an Internet mail service.

JOHN BLECK

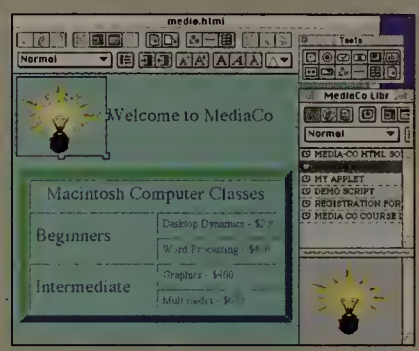
Sneak PEEK

Professional Web Authoring Made Easy

BY ROXANNE GENTILE

Can an HTML editor really substitute for years of hard-won experience in design and markup language? One of the top contenders among the half-dozen programs trying to answer that question is Claris Home Page, whose intuitive feel will be appreciated by Web novices. But with its simple navigation tools and sophisticated editing features, Home Page should also be a boon to experienced Web designers hoping to save time and elbow grease.

Comprehensive Tool Bar First-time Web authors can choose between Home Page's tool bar or a floating palette to generate simple pages using standard buttons for aligning text and setting character attributes, as well as inserting bulleted and nested lists, images, horizontal rules, frames, tables, links, and anchors.



For easy Web page development, Claris Home Page lets you drag and drop elements from customized libraries into your HTML document.

More experienced designers will appreciate the ability to display the HTML document source instantly in fully editable form, as well as the ability to find and replace functions for easy updating. A click of a button immediately previews the document within whatever browser you have installed. Another big plus is drag-and-drop support from user-customized libraries of clip art, boilerplate text, CGI scripts, and applets.

Timesaving Features Simple frames and tables, a pain in the neck to hand-code in HTML, can be generated instantly in Home Page with a few mouse clicks. But you must view frames in a frame-supporting browser such as Netscape Navigator, which can mean working in several windows at once.

With Home Page's Object Editor (similar to PageMill's Attributes Inspector), quickly editing nearly any element of your document—such as frames, images, tables, and forms—should be a snap for experienced designers. Of course, building elegant-looking tables and frames will still require a basic understanding of Web authoring concepts such as URLs in framed documents, sizing by pixel or percent, relative URLs, and circular image maps. Though rank beginners can expect to have a tougher time, Home Page's cursor-activated help messages will get them up to speed.

Claris Home Page isn't yet able to display HTML files dragged and dropped from other applications, and it lacks a palette of displayable background colors, which is high on our wish list. Nevertheless, this is the arrival of a very dependable tool for all-around Web design and a timesaver for sophisticated designers.

between $350 and $400.

Apple says the next generation of Power Macintoshes, due next spring, will come bundled with PCI-based Firewire cards. By 1998, Power Macs and PowerBooks will have Firewire ports integrated into their motherboards. In addition, the Pippin game platform will incorporate Firewire ports next year.

Blazing Speed Firewire transfers data at a top speed of 400 megabits per second (Mbps)—about 50 megabytes per second (MBps)—which is 25 percent faster than the 16-bit Ultra SCSI interface, which tops out at 40 MBps.

This past January, Microsoft committed to support Firewire in new versions of Windows. And while Intel is building the competing Universal Serial Bus (USB) into its motherboards, it believes the two interfaces can easily coexist. According to an Intel spokeswoman, the low-end/high-end split between USB and Firewire would be similar to the split between Enhanced IDE storage devices in low-end desktop PCs and SCSI storage devices in high-end desktops.

USB for Low-Speed Devices Intel has begun incorporating dual-port USB connections on its motherboards. But with USB's data-transfer rate of 12 Mbps, compared with Firewire's 400 Mbps, Intel acknowledges that USB is more likely to be used to connect input devices such as keyboards, handheld scanners, joysticks, and mice, as well as output devices like monitors and speakers. By contrast, Firewire can support input devices such as flatbed scanners, set-top boxes, and digital cameras; output devices such as printers and videocassette recorders; and storage devices.

Both Apple and Intel are promoting their respective interfaces as connections for videoconferencing and telephony applications. While Firewire can connect up to 63 devices, USB can connect up to 127 devices.

Firewire has already grabbed a foothold in consumer electronics, and its viability there is one factor driving its acceptance. Sony is building digital cameras with a Firewire interface for downloading video, and in its booth at the fall 1995 Comdex trade show, the company exhibited an entire wall of computer and consumer-electronics devices connected via Firewire.

Other members of the 1394 Trade Association (the name comes from the official name for the Firewire standard, IEEE 1394) include semiconductor manufacturers Advanced Micro Devices, National Semiconductor, Symbios Logic, and Texas Instruments; printer manufacturer Lexmark; and storage manufacturers Seagate and Toshiba.

communications

Is There Life after PowerTalk?

ITS FEATURES MAY LIVE ON IN MAC OS 8

by Tova Fliegel

Now that PowerTalk's demise is official, will Apple integrate E-mail, as well as global directory and collaborative services, into Mac OS 8? At press time, Apple would say only that mail and messaging capabilities for the next major Mac OS would be based on Internet standards.

And now, months after it

continues

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Circle 14 on reader service card

halted PowerTalk development (see *News*, March 1996), Apple has finally released PowerTalk Manager 1.5, whose long-awaited Mailbox API provides the ability to read, forward, and store in folders messages from PowerTalk's desktop mailbox. No, this is not a move to revive PowerTalk, but rather a "might-as-well" decision to release the fruit of years' worth of development dollars.

The Move to LDAP Meanwhile, Microsoft and Netscape, along with 40 other vendors (not including Apple), announced support for a variant of the X.500 directory services protocol. Microsoft and Netscape will integrate the Lightweight Directory Access Protocol (LDAP) into their browser and server solutions.

Global directories are essentially company and intercompany address books. PowerTalk was supposed to work with gateways based on X.500, one of the internationally accepted standards for global directory services, but it never quite got there. Now Web servers can present these yellow pages–type address listings as Web pages, and, regardless of platform, you can access the server through a browser, get the address needed, and send an E-mail, fax, or voice-mail message.

Many client-side products, like Qualcomm's Eudora and Apple's Internet Mail Server, already provide the Internet-based messaging that PowerTalk was supposed to offer. But these existing Post Office Protocol (POP)–based mail applications require users to download messages from the server before reading them—not the best solution for people who move from Macintosh to Macintosh on large campus networks.

IMAP to the Rescue? Apple could solve that problem by integrating the Interactive Mail Access Protocol (IMAP) with its Internet Mail Server or a client mailer such as Claris Emailer. IMAP is more sophisticated, more manageable, and more configurable than POP. But employing IMAP and its ability to download messages selectively may be overkill until Internet access truly becomes a commodity service that lets users send larger messages, sound, and graphics files.

Where does Apple stand on these possible solutions? The few PowerTalk faithful and the many Mac OS 8 hopeful are waiting to find out.

"POWER COMPUTING"

continued from page 41

Computing had to go back to the Tsunami to get six PCI slots. The use of Apple's memory interleaving plus Power Computing's enhanced cache controller make up the bus-speed difference, the company says.

To increase drive performance, Power Computing includes the SpeedAccess portion of Connectix's Speed Doubler and automatically sets the disk cache to 1/16 the amount of RAM—2MB on a system with 32MB of RAM—compared with the old Power Mac standard of 96K. Macworld Lab's results show the effects of these optimized defaults.

The PowerTower Pro comes in a redesigned case that accommodates its eight internal drive bays: four front-accessible 5¼-inch bays, two front-accessible 3½-inch bays, and two internal 3½-inch bays. The base model's bundled internal drive is an AV-ready 2GB drive. It shouldn't come as a surprise that you can buy a RAID package that includes an Ultra SCSI card and two 4GB drives. An 8× CD-ROM drive is standard, and you can add an internal Zip or Jaz drive from Iomega.

Standard on the PowerTower Pro is an IMS TwinTurbo 128 PCI graphics card with 8MB of RAM, which supplies high-speed display even at two-page resolution running 24-bit color. While the base models come with 16MB of RAM, Power Computing expects most people to upgrade to 32MB, a $109 option. The PowerTower Pros are expected to be available on July 22.

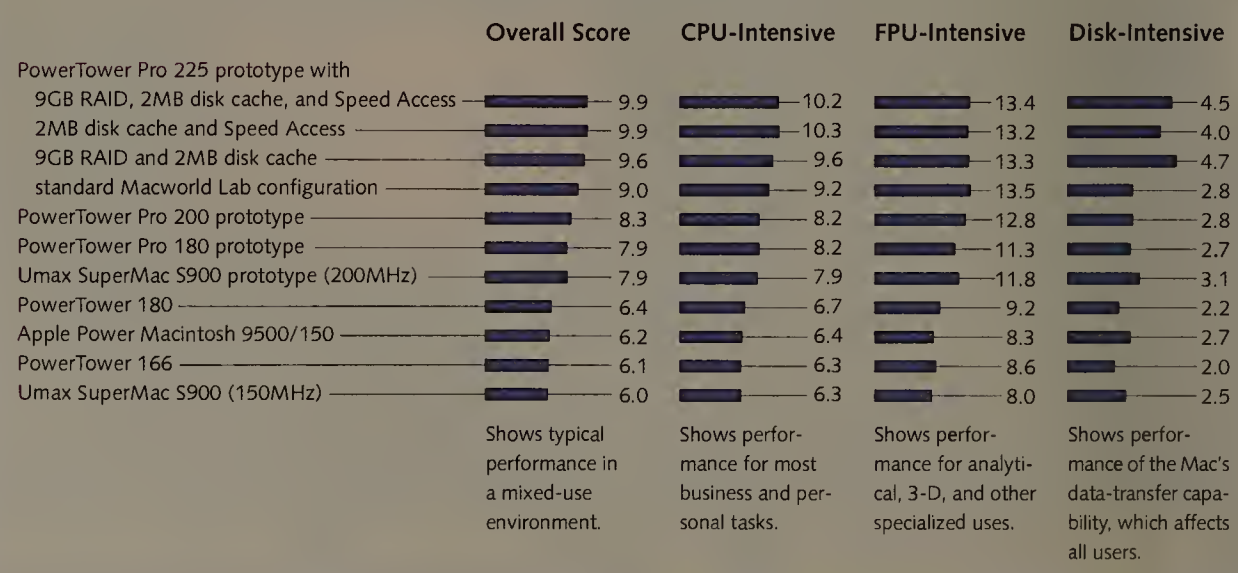
New AV Bundle Separately, Power Computing also announced an AV-card option that includes the 60-fields-per-second, full-screen miroMotion DC20 PCI video-digitizing and playback card with the limited edition of Adobe Premiere. The bundle costs $5495 with a new 180MHz system, $5795 with a 200MHz system, and $6295 with a 220MHz system.

MW LAB

New PowerTower Pro Redefines Speed

Just a few months ago, Power Computing outpaced the competition. Now it widens the lead with new systems based on the PowerPC 604e. (Umax plans to introduce its 604e-based 200MHz SuperMac later this summer; its results are shown below.) The new CPU provides part of the kick; the rest comes from the use of both a large (2MB) disk cache (Macworld Lab normally tests with a 96K cache) and Connectix Speed Doubler's Speed Access disk-acceleration software (bundled with the PowerTower Pros), as Macworld Lab results show. For details on our tests and comparisons with other recent Macs, see "The New Speed Champs," July 1996.—**Macworld Lab testing supervised by Mark Hurlow and Chris Uiterwijk**

Longer bars are better. Results are times as fast as a Centris 650 (Centris 650 = 1.0). Products are listed in decreasing order of overall performance.



A Running Start.

(Kevin Irby on Adobe® Photoshop®)

Artist, Kevin Irby mixed contemporary and archival images to enter a whole new dimension. His tool of choice: Adobe Photoshop. "The cool thing about Photoshop," says Irby, "is that the tools really give you a running start. Using filters, I created a smooth harmony between the two main images. Layers helped me experiment and tweak the work to get the effect I was looking for." In fact, any graphic artist who can work with a computer can easily work with Photoshop. If you want to jump start your work, whether it's print, the Web, or CD-ROMs, add Adobe Photoshop to your essential list of tools. For more information, call 1-800-492-3623 Extension F1277, or visit us at http://www.adobe.com.

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Circle 253 on reader service card

What *was* on your PowerBook?

Amazing where you'll find PowerBooks these days. On the road. In the air. At the beach. Everywhere.

Only thing is, they're traveling around with important files that don't exist anywhere else. And every disaster that can happen to a Mac in the office is multiplied when you take a PowerBook into the world. Like cocktails in the keyboard. Or when it gets hijacked at the airport. Voltage spikes. Gorilla bellhops. The unfortunate farewell when you leave it behind in a cab.

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Circle 26 on reader service card

New Products

THE LATEST MACINTOSH RELEASES

COMMUNICATIONS

Modems Go Nova

Need a multifunctional PowerBook peripheral? NovaLink's (510/249-9777, *http://www.novatech.com*) NovaModem 288 is a $300 PCMCIA modem that combines voice, data, fax, and cellular capabilities. Features include 28.8-Kbps data transmission and Smith Micro's MacComCenter Voice software.

DISPLAY

Brilliant Displays

Philips Electronics (800/235-7373, *http://www.pps.philips.com*), the Dutch electronics giant, has introduced its Brilliance line of color monitors. The 15-inch, $500 Brilliance 105 offers maximum resolution of 1280 by 1024 (1024 by 768 recommended) and 0.28mm dot pitch. The 17-inch, $1000 Brilliance 107 and 21-inch, $2500 Brilliance 201 feature maximum resolution of 1600 by 1280 (1280 by 1024 recommended) and 0.26mm dot pitch. For color-critical applications such as digital prepress, Philips offers a $2700 CS version of the 201 that incorporates its CyberScreen Technology for individually modifying color, brightness, and convergence. Both versions of the 201 include Sonnetech's Colorific monitor-calibration software.

KDS VSx-7

A Visual Sensation

KDS USA (714/379-5599) has unveiled two new Macintosh-compatible color monitors in its Visual Sensations series. Both feature built-in speakers, a 0.28mm dot pitch, maximum resolution of 1280 by 1024, and horizontal scanning frequency of 28kHz to 66kHz. The VSx-5, priced at $389, is a 15-inch monitor, while the $649 VSx-7 comes in at 17 inches.

GRAPHICS

MetaTools Gets Gooey

MetaTools (805/566-6200, *http://www.metatools.com*) has introduced PowerGoo, a $50 graphics package that treats images as if they were printed in liquid. Using brushes from a Goo Palette, you can stretch, smear, and otherwise distort pictures in real time. A Global Effects palette allows you to apply special effects to the entire image, and a Fusion palette allows you to merge two images into one. You can also convert the distorted images into QuickTime or Video for Windows movies using a Keyframe palette. You get Mac and Windows versions plus 80 clip photos on one CD. Eastman Kodak will bundle a stripped-down version of the software with its digital cameras.

Sharpen Your Stencil

You need to generate numerous business graphics, but you're not an artist. Where do you turn? Try Kaetron Software's (713/298-1500) Stencil It for the Macintosh, which simplifies creation of business forms, flowcharts, maps, banners, and similar material. For a street price of $100, you get a series of Stencils, images that you can combine into a wide range of business-oriented graphics. You can modify and link the stencils in various ways: automatically defining line connections for flowcharts and network diagrams, and attaching comments. Images can be nested within other Images and linked to other applications. An included utility called Web It can automatically convert images into GIF format and generate image maps, making them ready for use in Web pages.

MULTIMEDIA

Director Makes Screen Savers

Thanks to CineMac Screen Saver Factory from MacSourcery (619/747-2980, *http://www.macsourcery.com/*), you can now turn Macromedia Director Projector files into stand-alone screen savers. The product allows users of Director 5.0 to create screen savers as small as 800K. Applications include interactive presentations that can run on a tradeshow computer unattended. The estimated street price is $300 for a license to distribute up to 10,000 screen savers, and $1000 for a license to distribute an unlimited number of screen savers.

Power R AV-10

Adaptable AV

Business presenters have many options for projecting images from their Macs. Covering all bases, Power R (206/547-8000) has introduced the AV-10, a $300 audiovisual adapter that provides multiple outputs for LCD panels, LCD and CRT projectors, public-address systems, and stereo systems. The product works with all Power Macintosh models, Macs with built-in video, most PowerBooks, and most third-party video boards. Other Macs, including the Performa LC 520, 550, 575, 580, 5200, 5300, and 5400, can work with the AV-10 when equipped with a Power R Presenter adapter ($79 to $199).

NETWORKING

Web Sites Say WOW

Intranets are a great way to share information within a group. Wide Open Web (WOW) from Wide Open Workshop (206/364-8601, *http://www.wide-open.com*) takes the concept a step further by letting you open Macintosh files and applications by clicking on links in a Web browser. For example, you can open a Word document or FileMaker database simply by clicking on a link. The HTML author identifies files or folders to be accessed and creates WOW files, similar to aliases, that can be linked to the Web site. When you click on the link, an application opens the file.

Network Boards Go to School

Farallon Communications (510/814-5100, *http://www.farallon.com*) has announced the EtherMac LC Comm Slot Card, an Ethernet board that fits into the communications slot of Macintosh LC and Performa computers. Aimed primarily at the education market, the boards are available in 10BaseT, Thinnet, and EtherWave versions. Supporting AppleTalk, TCP/IP, and IPX protocols on AppleShare, NetWare, and Windows NT networks, the boards ship with a one-button installer and diagnostic software. The 10BaseT version sells at an estimated street price of $76, $375 for a 5-pack, and $1845 for a 25-pack. The Thinnet version sells for an estimated street price of $89.

A Window on Backup

Users of Retrospect and Retrospect Remote file-backup software from Dantz Development (510/253-3000, *http://www.dantz.com*) can now add Windows machines to their client mix. Remote Pack for Windows 95/NT permits any Mac running Retrospect to back up a PC over a network. Once you install the Remote client software on a Windows machine,

continues

New Products

you can activate it from any Mac on the network running Retrospect or Retrospect Remote 3.0 or later and Open Transport 1.1 or later. Remote Packs are available in increments of 5 ($169), 10 ($249), and 50 ($1095) users. Retrospect sells for $249, with Retrospect Remote priced at $449.

ONLINE

Roasting the Macintosh

Macintosh Webmeisters suffering from Java envy now have a tool that allows them to take advantage of the Web-oriented programming language from Sun Microsystems. Natural Intelligence (617/876-7680, *http://www.natural.com*) has announced Roaster, which allows Macintosh users to create Java programs. Features include an integrated browser, HTML editing tools, context-sensitive online help, including a database that cross-references the Java Developer's Kit. The product supports AppleScript and includes an AppleScript wizard that walks you through the process of building Java classes. You can also retrieve and run Java applets from the Web. A Roaster subscription that includes all updates is priced at $299, or $99 for an academic version.

Keep Your Dates on the Web

Foresight Technology (817/731-4444, *http://www.fsti.com*) has introduced CalendarSet/CGI, a $149 software package that allows you to create calendars for display on the World Wide Web. The calendars can be viewed and updated using standard Web browsers, with password access determining your ability to modify the entries. Calendars can be generated as clickable images or HTML tables. Clicking on a calendar event can generate added information or send you to a different Web site. Knowledge of HTML is not required to use the software, but you can add your own HTML coding to header and footer fields in each calendar.

The Web in Four Dimensions

DataCraft (303/232-4321) is shipping a set of software tools for creating 4th Dimension databases searchable over the Web. DataWave generates HTML-tagged Web pages on the fly from the database without requiring custom coding. Any browser that supports forms and tables can search the databases. DateWave can also display external files and images from the database. Priced at $249 per developer, DataWave requires Foresight Technology's NetLink/4D or Internet ToolKit for low-level communications. Both products are also available from DataCraft.

PUBLISHING

Flatbeds Reach New Heights

High-end flatbed scanners are all the rage these days among prepress professionals. These CCD devices, which compete with PMT-based drum scanners, are too pricey for most end users, but don't be surprised to see them show up at your friendly neighborhood service bureau.

The Topaz and Topaz Robot from Linotype-Hell (516/434-2000), introduced last year, have been upgraded. The new versions feature twice the scanning speed, maximum optical resolution of 5080 dpi, and a $19,000 Copix hardware-software option for scanning existing film separations. The Topaz Robot adds automated batch-scanning capabilities. Price remains at $49,000 for the Topaz, but the Topaz Robot has been reduced to $64,000. Prices include one week of training.

Linotype-Hell Topaz

STORAGE

EZFlyer Soars to 230MB

SyQuest Technology (510/226-4000, *http://www.syquest.com*) has launched the latest round in its battle for removable-storage supremacy. EZFlyer 230MB is a $300 removable-drive system that packs 230MB on SyQuest's 3.5-inch Power Disk Cartridge media. For Macintosh users, SyQuest offers a SCSI version of the $200 drive with a maximum sus-

SyQuest EZFlyer 230MB

tained data-transfer rate of 2.4MB per second. Cartridges are priced at $20 each, with volume discounts available. Although the drive can also read, write, and format the 135MB disks used in SyQuest's EZ135, it's incompatible with other SyQuest media, including 5.25-inch cartridges and 270MB and 540MB 3.5-inch disks. The drive ships with a SCSI cable and one 230MB cartridge.

Towering CDs

The CD Tower series from Procom Technology (714/852-1000) uses the company's Smart SCSI CD board to map up to seven CD-ROM drives to a single SCSI address. Customers can choose from 4× or 6× CD-ROM drives. The CD Tower-7Mac, priced at $3800, includes seven 4× drives. Also available are the $6600 CD Tower-14Mac, which supports 14 drives, and the $13,000 CD Tower-21Mac, which supports 21 drives.

Raising the ante is Optical Access International (617/937-3910, *http://www.oai.com*), whose CD/Enterprise Server 6400 provides simultaneous access to 64 CD-ROM drives over AppleTalk networks. OAI also offers servers that can handle 24, 32, 40, 48, and 56 CD-ROM drives. Drives are placed in 19-inch racks, each capable of holding 8 drives. You can add or remove drives on the fly using a control panel. Pricing begins at $18,600 for a 24-drive system.

Smart Tape

Sony (408/432-1600) has unveiled a new 3½-inch high-capacity tape format, along with the first tape drive and media to feature the technology. Advanced Intelligent Tape can store up to 25GB (50GB compressed) in a 3½-inch tape cartridge, supporting transfer rates of 3MB per second (6MB compressed). SDX drives that use the technology will be available in several versions, including a $4995 model with a built-in data-compression chip. At the end of the year Sony plans to introduce a drive that incorporates its Memory In Cassette (MIC) technology, in which a 16Kbit memory chip is built into the data cartridge. The chip contains a copy of the system log, enabling fast access to the data stored on tape. Cartridges without MIC will sell for $99. Pricing for MIC drives and cartridges has not been set.

APS Climbs Olympus

APS Technologies (816/483-6100, *http://www.apstech.com*) has introduced the APS 2.6GB MO, a 2.6GB magneto-optical drive based on a mechanism from Olympus. The $1800 drive includes a 4GB cache buffer for fast throughput. It can also read ISO-standard 650MB and 1.3GB media. APS is also shipping the APS I 1.2, a 1.2GB SCSI-2 hard drive for the PowerBook 500 and Duo 200 series that sells for $800.

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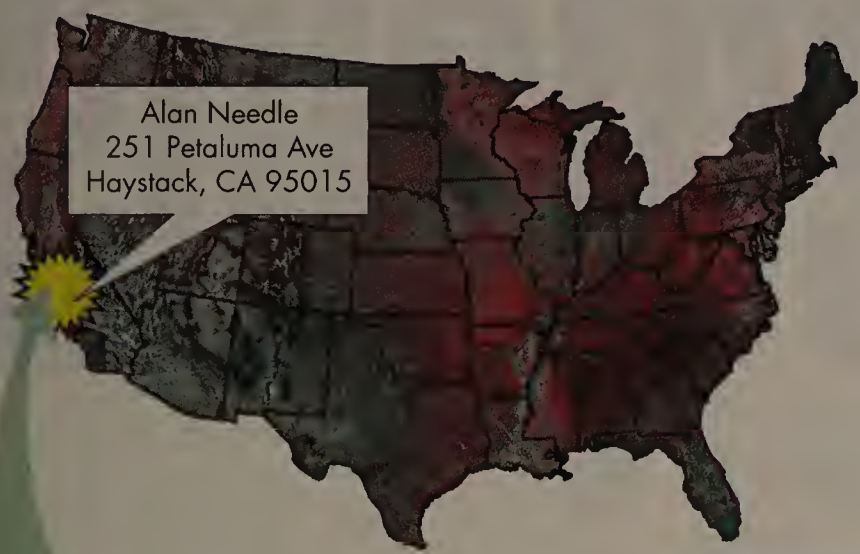

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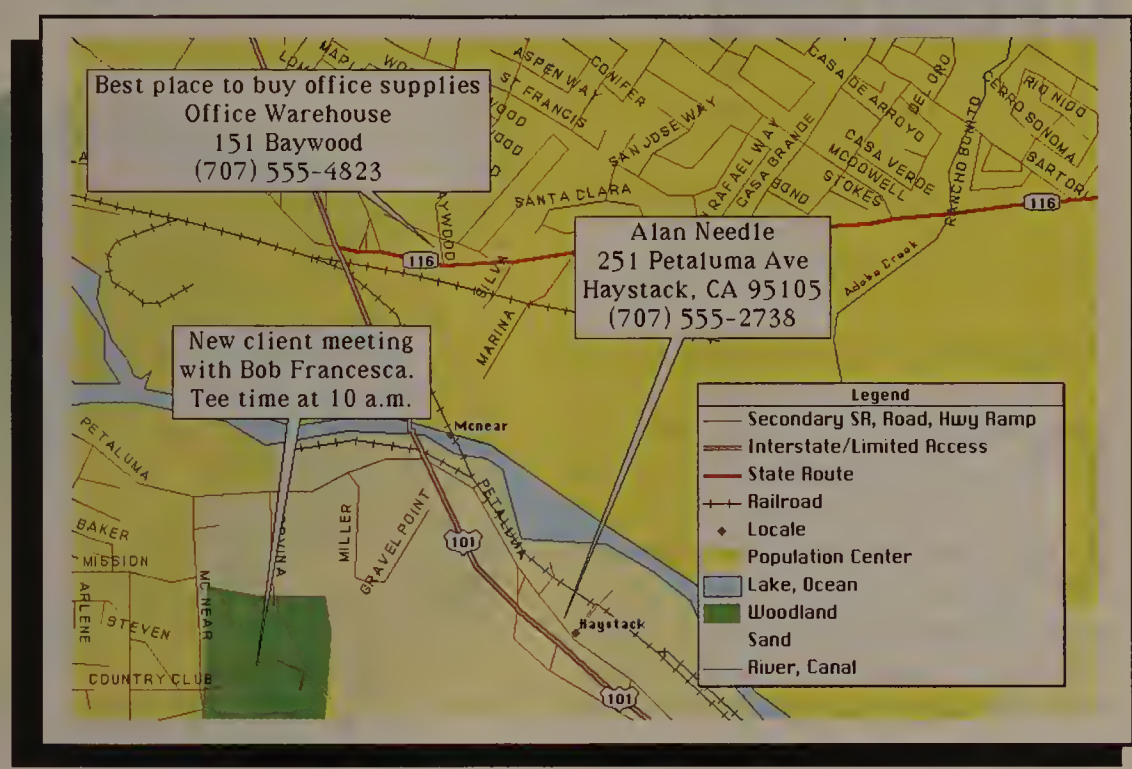

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Reviews

Cyberdog

INTERNET TOOLS ARE A COOL BUT INCOMPLETE SHOWCASE FOR OPENDOC TECHNOLOGY

HANK OSUNA

CYBERDOG IS AN ODD MUTT. IN fact, looking at Apple's OpenDoc-based collection of Internet tools and technologies in a quick comparison with the ambitious features of Netscape Navigator or Microsoft Explorer might lead you to conclude that Cyberdog is the runt of the litter. Like a lot of runts, though, Cyberdog has great potential.

Cyberdog was originally created to demonstrate the document-centric OpenDoc technology, but when the Internet tsunami hit the computer industry, Apple decided to release Cyberdog as a full-fledged product. Currently, Cyberdog is available for free from Apple's Web and FTP sites (*http://cyberdog.apple.com*).

Introducing OpenDoc

To understand Cyberdog, you need to understand OpenDoc. OpenDoc and other component software are meant to replace behemoth programs overburdened with features with leaner, meaner computer applications. Component software uses specialized "parts" with only the features needed to perform a certain task. Parts are like mini-applications that work within documents created by "container" applications. For example, you could embed an image-editor part in a document created in a container-application—say, an OpenDoc-aware version of Nisus Writer or Adobe PageMaker—and then use the part to manipulate images within the document. Think of OpenDoc as a sophisticated variation of Photoshop plug-ins but with dynamic and seamless integration across your work. It's an exciting concept at an awkward adolescent stage.

Using Cyberdog

Once you've installed OpenDoc and Cyberdog, the best way to learn how to work with the Cyberdog parts is to open the included OpenDoc container Starting Point. Starting Point functions like a Web home page, with six buttons, each linked to a different Internet resource: Notebook, an address book for URLs; Log, a sortable record of the last 200 resources you visited; Explore, a link to an Apple Web site that explains the Net; Search, a link to the Alta Vista engine; Mail, an E-mail part; and News, a newsgroup part.

The Notebook tool stores addresses for E-mail, the Web, FTP, Telnet, Gopher, and newsgroups. Clicking on an address opens the appropriate Cyberdog part and connects you to that resource.

RATINGS | Outstanding ★★★★★ = 9.0–10.0 | Very Good ★★★★ = 7.0–8.9 | Good ★★★ = 5.0–6.9 | Flawed ★★ = 3.0–4.9 | Unacceptable ★ = 0–2.9

The Notebook isn't particularly strong; there's no search tool and you can't cross-reference categories. While you can organize your bookmarks into Finder-like folders, you can go only one folder deep. Still, it's likely to be one of the main ways you organize and access your Net addresses. It's also probably the first part that will be replaced by a third-party commercial product. OnBase Technology's DragNet application (see *Reviews*, May 1996) may be available as a Cyberdog part by the time you read this.

Cyberdog's simple but handy Log keeps a history of the places you visit on the Net, saving them as active links and dropping the oldest links as you visit new sites. You can sort the Log by name, time, and site location. If you forget to bookmark a site, it's easy to check the Log and drag an address into your Notebook.

The Interface

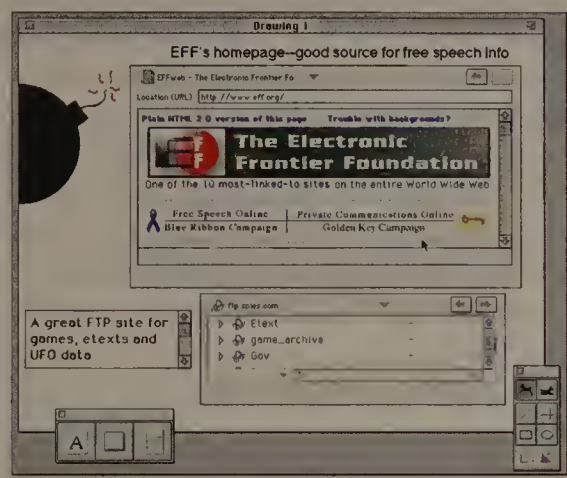
When you click on a Notebook resource or on one of the buttons in the Starting Point container, Cyberdog opens one of two basic interfaces for accessing Net resources. Web, FTP, and Gopher sites share a simple-to-use browsing window, with contextual menus that change depending on the type of resource you're browsing.

FTP and Gopher sites appear in the main window with familiar folder-style navigation. The part is well integrated with the Finder, allowing you to drag a resource's icon onto the Finder's desktop, where it remains an active link. Clicking on a resource opens the Cyberdog browsing interface, making the Net feel like an extension of your hard drive. This kind of integration with the Mac OS makes Cyberdog worthwhile.

The Web browser uses the same type of window, but Cyberdog displays Web pages more simply than Navigator or Explorer does. It supports HTML 2.0 standards, with a few additions, including tables and backgrounds, but without the bells and whistles, such as Java, animated GIF89a files, or Netscape-style plug-ins like Macromedia's Shockwave. Apple plans to support these features in a version due later this summer.

For E-mail and newsgroups, Cyberdog uses a message-based interface. The news reader is functional but plain; it handles messages folder-style, so you can expand and collapse threads. It doesn't translate binary files as well as other readers, but that's a minor point for most users.

E-mail is full-featured but doesn't really take advantage of OpenDoc's strengths. For instance, you can't embed a Web page in an E-mail message except as a link or an attachment. Since embedding parts in documents is supposed to be a basic function of OpenDoc, this is an egregious omission. Still, you can set up E-mail in-boxes for Internet E-mail accounts that use the POP protocol and have Cyberdog check for mail at scheduled intervals. The E-mail part uses the Notebook as an address book—not a particularly robust solution.



Creating an Active Internet Document Using DocBuilder, I embedded FTP and Web parts in a document, along with graphics and text.

The strongest feature of the E-mail and news interfaces is Cyberdog's "handlers," rules that screen your messages by subject, sender, or body text for special handling, like throwing all E-mail from a particular sender in the Trash. For newsgroups, a handler works as a kill file, screening out specific posters with ease. Handlers work on both incoming and outgoing messages.

Building the Net into Your Files

All the Cyberdog parts—Web browser, FTP, Gopher, E-mail, newsgroups, Notebook, and Log—are functional and decently designed, but OpenDoc's real strength is its ability to create documents with directly embedded Net resources.

Imagine designing an annual report and embedding live Web pages that chart your up-to-the-minute stock price. Your child could create a term paper with live links to the Library of Congress or a museum. Software companies could ship their products with electronic docs containing FTP links to the latest versions.

Well, Cyberdog ain't there yet. You can get an idea of how it *should* work by playing with DocBuilder, a small application that comes with Cyberdog, but it's only a very basic drawing tool for creating simple OpenDoc containers for Internet resources that use Cyberdog parts. Until companies offer word processing and page-layout programs that support OpenDoc, we won't really get the complete component-software experience.

This leads to my biggest complaint about Cyberdog: like OpenDoc, it's just not quite finished. While Apple designed Cyberdog parts to be replaced by more robust third-party tools, none are available. At press time, documentation was at the draft stage. Cyberdog has the feel of a first-generation Apple technology—it uses too much RAM, it feels clunky and slow, and certain elements (like DocBuilder and the Starting Point container) look as if a third-grader created them using an old version of HyperCard.

As it stands today, Cyberdog is a skeleton technology waiting to be filled out with third-party products—and that means getting Mac developers to support it. Like a lot of Internet technology, it's best understood and evaluated as an architecture, a work in progress.

The Last Word

Cyberdog is a five-star concept; it's where the Net should be headed. Integrating the Internet into the documents we work with and offering Net access across applications using dynamically loaded components seem natural and intuitive. Once again, Apple and the Macintosh are on the leading edge, outpacing Microsoft's less elegant OLE/ActiveX system. Mix Cyberdog with innovations like Java and the features we'll see in Mac OS 8, and it'll be a powerhouse way to use the Net.

But as a ready-to-use product, Cyberdog feels incomplete, despite its innovation. With Apple's track record for launching new technologies, Cyberdog could end up as yet another stray in the Internet pound. While I'd love to take Cyberdog home, I think I'll wait until this pup is a little more mature.—MATTHEW HAWN

RATING: ★★★/6.9 **PROS:** Great price; innovative architecture has enormous potential for changing the way we use the Net. **CONS:** Basic parts are bare bones; Power Mac only; large RAM requirement. **COMPANY:** Apple Computer (408/974-1010, *http://www.apple.com*). **LIST PRICE:** Free online.

PC-Compatibility Solutions

SOFTWINDOWS, PCI CARDS MAKE DIFFERENT TRADE-OFFS

ALTHOUGH WINDOWS 95 HAS been a mixed success, Macintosh users have made it clear that they want it on their Macs. And now—almost a year after Windows 95 shipped—options finally exist. Insignia Solutions' SoftWindows 95 is here, as are PC-compatibility PCI cards from Apple and Orange Micro. Also new on the scene: SoftWindows 3.0, a Windows 3.11 environment useful for those places where Windows 3.1 still rules. The advantage of the cards is performance, while the advantage of SoftWindows is portability: any PowerPC-based Mac—even a PowerBook—will run the program given enough RAM.

Pentium Inside—for a Price

Early PC-compatibility cards were hampered by NuBus's relatively slow data rate and by reliance on 80486-class CPUs. Today, the Pentium has arrived on the Mac, with Apple's Power Macintosh 7200/120 PC Compatible's 100MHz Intel Pentium coprocessor card. (Apple also sells the card by itself for use in any PCI-based Mac.) Orange Micro offers PCI cards with a range of 486 and 5x86 CPUs; we tested the 100MHz Cyrix 5x86. Orange Micro is slated to release the true Pentium-based 500-series version of its OrangePC cards by August.

The Apple and Orange Micro PC-compatibility cards offer performance comparable to that of real PCs. After all, they *are* real PCs, shrunk down to cards, that can use the Mac's drives, monitor, mouse, keyboard, and ports. Macworld Lab found no speed degradation in the PCI-based cards—that's good news, since Orange Micro's previous NuBus products were significantly slower than same-speed PCs. (Apple's and Reply's previous cards used a Processor Direct Slot [PDS] interface to prevent such a slowdown, but couldn't be moved from one Mac to another with a different type of PDS.)

Because it relies on a Cyrix 5x86—a processor based on the older 486 architecture—the OrangePC 440 is slower than the same-megahertz Apple card. Even the faster Apple solution is no speed demon, offering overall performance no better than today's midrange PCs. Both cards come with a 256K cache and support video RAM (VRAM)—Apple's through sockets for RAM chips, and Orange Micro's through a VRAM slot. Apple's PC Compatible has 8MB of on-card RAM and one SIMM slot for RAM expansion. Orange Micro's card has two SIMM slots but no on-card RAM.

SoftWindows: Still Slow

Like previous versions, SoftWindows 95 and 3.0 install true Microsoft Windows on your Mac. To keep everything in software, SoftWindows emulates an 80486 CPU, translating 486 instructions into PowerPC calls. Insignia has done a remarkable job ensuring that Windows

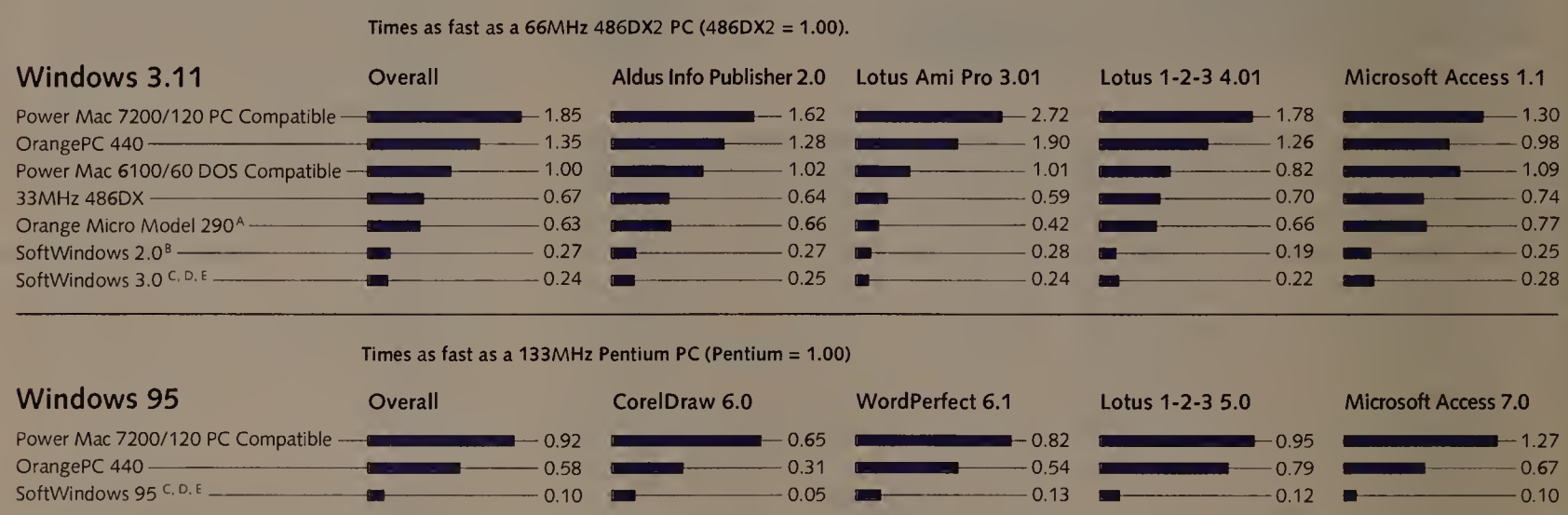
MW LAB

Cards Come On Strong, but SoftWindows Is Still Slow

SoftWindows remains the only Windows option for PowerBook owners, but at roughly the speed of a long-obsolete 20MHz 80386-based PC it's not much of an option.

Apple's new PC Compatible system offers strong performance—even outpacing our unoptimized, middle-of-the-road 133MHz Pentium PC in one test. The 5x86-based OrangePC 440 is slower than the Apple card in the 7200, since the 5x86 is based on the slower 80486 architecture. Both cards benefit from PCI—unlike with previous NuBus-based PC-compatibility cards, we found no slowdown due to data-transfer bottlenecks between the PC and the Mac.

Longer bars are better. Products are listed in decreasing order of performance.



A 486DX2/66 on Centris 650. B On Power Mac 7100/66. C On Power Mac 7500/100. D The Power Mac used an optional 256K cache card. E The system had 24MB of RAM and ran System 7.5.3.

Behind Our Tests

We tested all PCs (including the new cards) with 16MB of RAM, and Macs and all previously tested PC-compatibility cards with 8MB of RAM (unless otherwise noted). We used a Power Mac 7200/75 to test the PCI cards; other Mac models used are noted above. All Macs used System 7.5 unless noted. To boost the Macs' performance, we turned virtual memory off; under Windows, virtual memory was left on because it boosts performance for that operating system.—**Macworld Lab testing supervised by Chris Uiterwijk and Galen Gruman**

thinks it's running on a regular PC. Only a very few incompatibilities exist—such as the inability to launch Windows 95 CDs automatically—a testament to the strong engineering behind SoftWindows.

Although integrity remains strong, performance remains weak. Insignia claims a 35 percent speed boost over version 2.0; our tests showed no such thing. Running Macworld Lab's Windows 3.11 performance suite, SoftWindows 3.0 was actually a bit *slower* than previous versions. On a Power Mac 7500/100, SoftWindows 3.0 ran slower than SoftWindows 2.0 on a Power Mac 7100/66. Looking at the individual tests, it's clear that the slowdown relative to SoftWindows 2.0 comes in I/O and display; when you play CD-based games or install software, everything takes forever, and video and animation stutter along. SoftWindows 95 performs similarly slowly.

KEVIN CANDLAND

The OrangePC 440 (left) and Power Mac 7200/120 PC Compatible

Because SoftWindows has to emulate a complex CPU, the program takes up gobs of RAM—you simply cannot run it with less than 24MB, even with most extensions disabled and nothing else running. Insignia recommends 32MB of RAM, and for good reason: with 24MB of RAM, you get a mere 6MB to 7MB of RAM within Windows. Windows 95 performs best with 16MB of RAM, acceptably with 8MB, and poorly with 4MB.

Macworld Lab spot-tested both SoftWindows 3.0 and 95 on Macs with 32MB of RAM. The results were mixed. Under Windows 3.11, performance increased 10 to 20 percent. But under Windows 95, only printing and 3-D rendering tasks were greatly sped up.

Mapping the Territory

Our experience in using these solutions was, for the most part, identical to that of using a PC: the same headaches and the same strengths. Being on a Mac doesn't make a PC easier to use, but neither does it make it notably harder.

Except in one big case. PCs have two-button mice, and Windows 95 uses the right-hand mouse button to display a context-sensitive menu for selected objects. But most Mac mice have only one button. Apple and Insignia both have a clunky approach to enabling the right-mouse function—you select the object with the mouse and then use the equal-sign (=) key on the numeric keypad to invoke the right-hand mouse button.

Because you have to perform both actions with the right hand, SoftWindows 95 can be awkward to use unless you happen to be left-handed. (Orange Micro does it right: you hold the ⌘ key when clicking.) If you are going to run SoftWindows, you'll definitely want to replace your single-button Mac mouse with a programmable two- or three-button mouse and map the right-hand button to the appropriate key.

We encountered setup difficulties with both hardware options. The Apple card seemed to have defective on-card RAM; until we added a SIMM, it would not start up reliably. When trying to install Windows 3.11 on the OrangePC card, we experienced repeated system freezes—company representatives theorize that there may be a conflict between the card's video chip and Windows 3.11—and had to boot from SoftWindows to install the OS. Also, hitting ⌘-P when running the OrangePC card consistently caused the Mac to crash.

Weighing the Options

SoftWindows' emulation is great for limited usage, but if you'll be using your PC solution regularly, you'll want to turn to one of the card-based options. I prefer the Orange Micro card over Apple's: it comes with a full set of ports for PC peripherals, while the Apple card has only one serial port; and Apple's Windows interface support is awkward in several areas, not just in mouse mapping. It would be nice, for example, to be able to use the F-keys when in Windows rather than use ⌘-key equivalents. Of course, for the best performance, I recommend a separate PC. Complete 75MHz Pentium systems cost about $1500.

The Last Word

PC-compatibility cards aren't cheap: you can spend nearly as much on one as on a complete PC system. You're buying the convenience of saved desk space and Mac-PC integration. A hardware system, compared with the slower SoftWindows, is a must for anyone doing serious PC work in a Mac environment.—GALEN GRUMAN

Power Mac 7200/120 PC Compatible

RATING: ★★/4.3 **PROS:** Pentium performance. **CONS:** PC CPU is not upgradable; Mac upgrade to PowerPC 604 is expensive; mouse and key mapping to Windows isn't intuitive. **COMPANY:** Apple Computer (408/996-1010, *http://www.info.apple.com*). **COMPANY'S ESTIMATED PRICE:** $2799 (8MB of Mac RAM, 8MB of PC RAM; 1.2GB hard drive; Windows must be bought separately); card alone $1049.

SoftWindows 95

RATING: ★★/4.3 **PROS:** Faithful 486 emulation and Windows 95 port; strong support for peripherals and networking; TurboStart greatly speeds Windows 95 launching. **CONS:** Painfully slow; a resource hog; awkward mouse mapping. **COMPANY:** Insignia Solutions (408/327-6000, *http://www.insignia.com*). **COMPANY'S ESTIMATED PRICE:** $379.

OrangePC 440

RATING: ★★★/5.5 **PROS:** Offers more ports and expansion capabilities than Apple's card and better incorporates Windows interface standards. **CONS:** Middling performance compared with today's PCs; not significantly cheaper than a complete Pentium PC system. **COMPANY:** Orange Micro (714/779-2772, *http://www.orangemicro.com*). **DIRECT PRICE:** $1347 (16MB of RAM, 256K cache, no VRAM; additional cost for Windows).

SoftWindows 3.0

RATING: ★★/4.2 **PROS:** Faithful 80486 emulation and Windows 3.11 port; strong support for peripherals and networking. **CONS:** Painfully slow; a big resource hog. **COMPANY:** Insignia Solutions (408/327-6000, *http://www.insignia.com*). **COMPANY'S ESTIMATED PRICE:** $379.

Cross-Platform Utilities

SIX TOOLS BRIDGE THE MAC-TO-WINDOWS 95 GAP

AT ONE TIME OR ANOTHER, you've probably been forced to work with people you didn't like. You understood they provided valuable expertise to the company, but you'd feed your mouse to the cat before you'd ever socialize with them. For the Macintosh, the time is now and that colleague is Microsoft Windows 95.

To help you share files more easily with Windows 95 collaborators, six new cross-platform file-transfer utilities aid in détente. All are designed to work with Windows 95, and some work with Windows 3.1 as well.

These products range in price from $49 to $189, but don't let cost sway your decision. The least expensive product is also the least recommended, but the most expensive one wasn't my favorite, either. And don't forget, these products are designed only for transferring files between PCs and Macs, which means you must have the same application on both platforms. They're not file-conversion utilities like Mastersoft's Word for Word or DataViz's Conversions Plus.

The good news is that all six perform their most fundamental chore. Load them up, stick your Macintosh media into a drive, and open files without a hitch. With a single exception, they recognize periods as legitimate file-name conventions, and all but one come on a single disk, with clear documentation. The differences between the products are in their elegance. Utilities should be like angels—invisible but omnipresent. Unfortunately, some fail at even this basic level.

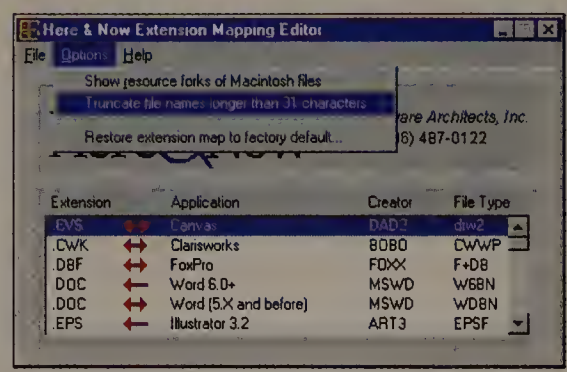
How They Behaved

To test these utilities, I gathered the most complex benchmark spreadsheets and complicated word processing files I could find—including one Microsoft Word 6.0 document with embedded Photoshop 3.0 PICT images that was saved to an older version of Word—and placed them on a Mac-formatted floppy disk. Then I opened those files on a PC running Windows 95 and checked out each utility's interface as well as its file-transfer and -naming features. Because Windows utilities frequently tuck obscure drivers deep into the operating system, I also uninstalled each application. There were some well-behaved applications and a few truants, listed here in general order of preference.

Here & Now 2.0

I loved the Windows 3.1 version of Here & Now so much that I never got around to deleting it from my own PC (see *Reviews*, November 1995). The new Windows 95 upgrade offers the transparency and ease of use of the original, but with some improvements. New options are evidence that the developer clearly anticipated the pitfalls users will run into when transferring files back and forth.

First, Here & Now is no longer confused by periods in file names. (Because DOS incorporates a period in its file-naming convention, file-transfer utilities can stumble when renaming files.) Even better, Here & Now 2.0 has an option that lets you toggle on or off the ability to use long, 255-character file names in Windows 95. If the option is enabled, you're forced to create a 31-character name (the Mac's upper limit); if it's disabled, file names are truncated with a tilde and a random set of three letters at the end. If you regularly trade files with Windows 95 users, ask them to keep the option enabled so you'll both know the exact file name.



31 Favors If you're going to trade files regularly with Windows 95 users, turn off the truncated file names option. That way, you'll always work with the same 31-character file names on both platforms.

Here & Now 2.0's best feature is its transparency: it can copy and rename files through Windows 95's My Computer interface; most of the other applications create their own dialogs or windows.

MacTransfer

If you're looking for simplicity, look no further. Leave it to cross-platform veteran Insignia Solutions to design a lean, clean utility that conforms to Windows 95 constructs so well.

MacTransfer's five options are self-explanatory and include a feature unique in this product genre: a character-mapping matrix. Although many of the default characters already match up, the ability to define your own equivalents can be a boon to folks who use unusual character sets. Unfortunately, unlike competing products that work with all manner of removable disks, MacTransfer works only with high-density Mac disks. If that's all you need, though, it works well.

MacOpener 2.0

When the first version of MacOpener debuted, I wasn't thrilled with it for a variety of reasons (see *Reviews*, March 1996). Thankfully, most of what I disliked has changed. One of the nice things about MacOpener 2.0 is that it's one of two packages that offer viewers for graphics files (TransferPro is the other). These viewers work with word processing documents too, but alas, not spreadsheets.

MacOpener 2.0 retains 1.0's File Navigator interface for its formatting and extension-mapping options, and like its predecessor, it still slips up occasionally on file names that include periods. When I copied a document titled 13.08 Tape Product Table from a Mac floppy to a PC hard drive, the name defaulted to 13.xls. You can, of course, rename PC files, but the other products handle this situation automatically.

I had some other concerns with MacOpener 2.0. When I copied files back to the floppy from the Windows 95 drive, their application icons—which had appeared originally—disappeared. In addition, the poorly designed File Navigator screen truncates Windows 95 and Macintosh file names to 22 characters, so you lose one of the advantages of long file names. And when I uninstalled MacOpener, some system files remained and had to be deleted manually.

Mac Drive 95

Like the preceding products, Mac Drive 95 worked great with my complex test files, and like Here & Now it forgoes its own screen in favor of Windows 95's My

continues

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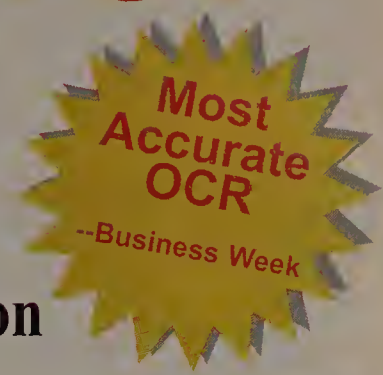

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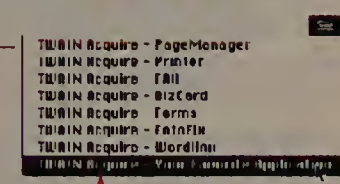

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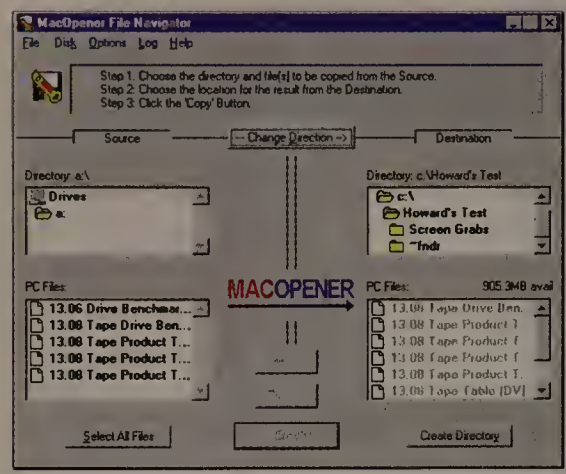
Circle 27 on reader service card



Don't Cut Me Short Although both Windows 95 and the Mac support long file names, MacOpener's File Navigator allows only 22 characters on screen. The last three files are all different, but you can't tell that based on what you see here.

Computer interface. It also features some nice options for multiplatform environments, including support for Windows NT and the ability to generate 8.3-style file names for Windows 3.1 users. Additionally, Mac Drive 95 lets you add a formatting option to the Windows 95 right-mouse-button menus, and can mount a Mac partition from dual-format hard disks or removable media.

Mac Drive 95 has its share of drawbacks. Clicking on its icon in the PC's Control Panels window displays your mounting and extension-mapping options, but to get to the disk-formatting utility, you have to launch the program from the Start menu. In addition, the application won't minimize down to the Windows 95 tool bar for easy access. The program doesn't uninstall properly either, leaving several pieces of itself strewn throughout the hard drive. Media4 is aware of these problems and is creating an update to fix them.

TransferPro

At $189, Transfer Pro is the priciest of the group, but it's the only package to include conversion capabilities for more than 15 graphics formats (MacOpener 2.0 includes viewers only). If you're moving lots of graphics between Macs and PCs (or between Unix workstations and PCs—it also handles Sun raster files), you'll want to consider TransferPro. However, it's also the only package that forces you to buy different versions based on which flavor of Windows you're running; Windows 3.1 and Windows NT versions cost $169 each.

We encountered several glitches in TransferPro, many of which the company plans to eradicate in an upgrade planned for later this summer. Some bugs relate to the application's third-party installer, which hasn't been updated for Windows 95. Once installed, TransferPro doesn't appear on the list of programs in Windows 95's Start button; you have to navigate the hard drive and launch the application by double-clicking. And its interface—a feature-rich screen with lots of clear options for copying and renaming files—is partially obscured by the Windows 95 tool bar.

XChange 1.2

I urge you to not be tempted by XChange's low price. Its sole differentiation from its competition: it's designed to accommodate cross-platform transfer of tape and CD-R media, but—here's the big catch—only if they were formatted using Optima's own utilities. On the bright side, XChange is the only product designed to work with Windows 3.1, 95, and NT right out of the box.

Launching XChange brings up a window that looks like the Windows 3.1 File Manager's ugly kid brother, with the Mac disk's contents on one side of the screen and the PC disk's on the other. Unfortunately, it doesn't behave exactly like File Manager. To copy a file, you have to drag it to the destination window. Up pops a Copy Files dialog box with appropriate path information, but there's one problem—you can't rename the file. There's a box for the file name, but it's grayed out.

I eventually located XChange's Rename feature, but when I typed in a new name, I got the message, "Error attempting to rename file." I tried again, and it worked . . . sort of: the new file name used all capital letters. When I tried to rename it with the proper capitalization, I got the error message again. When I brought this to their attention, Optima representatives sent out an update disk, which did not solve the problem.

The Last Word

Here & Now 2.0's simplicity makes it the best choice for helping Windows 95 files work with the Macintosh. MacOpener 2.0 is an improvement over the flawed original—but its reliance on DOS extensions in a long-file-name world is disappointing, even though it's nicely priced and offers graphics viewers. For inexpensive simplicity with some limitations, MacTransfer is a solid choice. Mac Drive 95 and TransferPro, though acceptable, need to work better in the Windows 95 world, and XChange is a buggy, premature disappointment.—HOWARD BALDWIN

Here & Now 2.0

RATING: ★★★★/8.2 **PROS:** Transparency and ease of use; new options anticipate file-transfer pitfalls. **CONS:** More expensive than some of its competitors. **COMPANY:** Software Architects (206/487-0122). **COMPANY'S ESTIMATED PRICE:** $75.

Mac Drive 95

RATING: ★★★/5.9 **PROS:** Formatting and mounting options. **CONS:** Installation leaves program pieces scattered. **COMPANY:** Media4 (515/225-7409, *http://www.media4.com*). **COMPANY'S ESTIMATED PRICE:** $60.

MacOpener 2.0

RATING: ★★★/6.7 **PROS:** Graphics viewers for Mac client. **CONS:** Problems with periods in file names. **COMPANY:** DataViz (203/268-0030, *http://www.dataviz.com*). **COMPANY'S ESTIMATED PRICE:** $50.

MacTransfer

RATING: ★★★/6.8 **PROS:** Simplicity; clean interface. **CONS:** Limited to high-density Mac disks. **COMPANY:** Insignia Solutions (408/327-6000, *http://www.insignia.com*). **COMPANY'S ESTIMATED PRICE:** $55.

TransferPro

RATING: ★★★/5.1 **PROS:** File conversion for more than 15 graphics formats. **CONS:** Glitches; installer not Win 95–ready. **COMPANY:** Digital Instrumentation Technology (505/662-1459, *http://www.dit.com*). **COMPANY'S ESTIMATED PRICE:** $189.

XChange 1.2

RATING: ★★/3.7 **PROS:** Low cost. **CONS:** Buggy; interface looks like File Manager but doesn't work that way. **COMPANY:** Optima Technologies (714/476-0515, *http://www.optimatech.com*). **COMPANY'S ESTIMATED PRICE:** $49.

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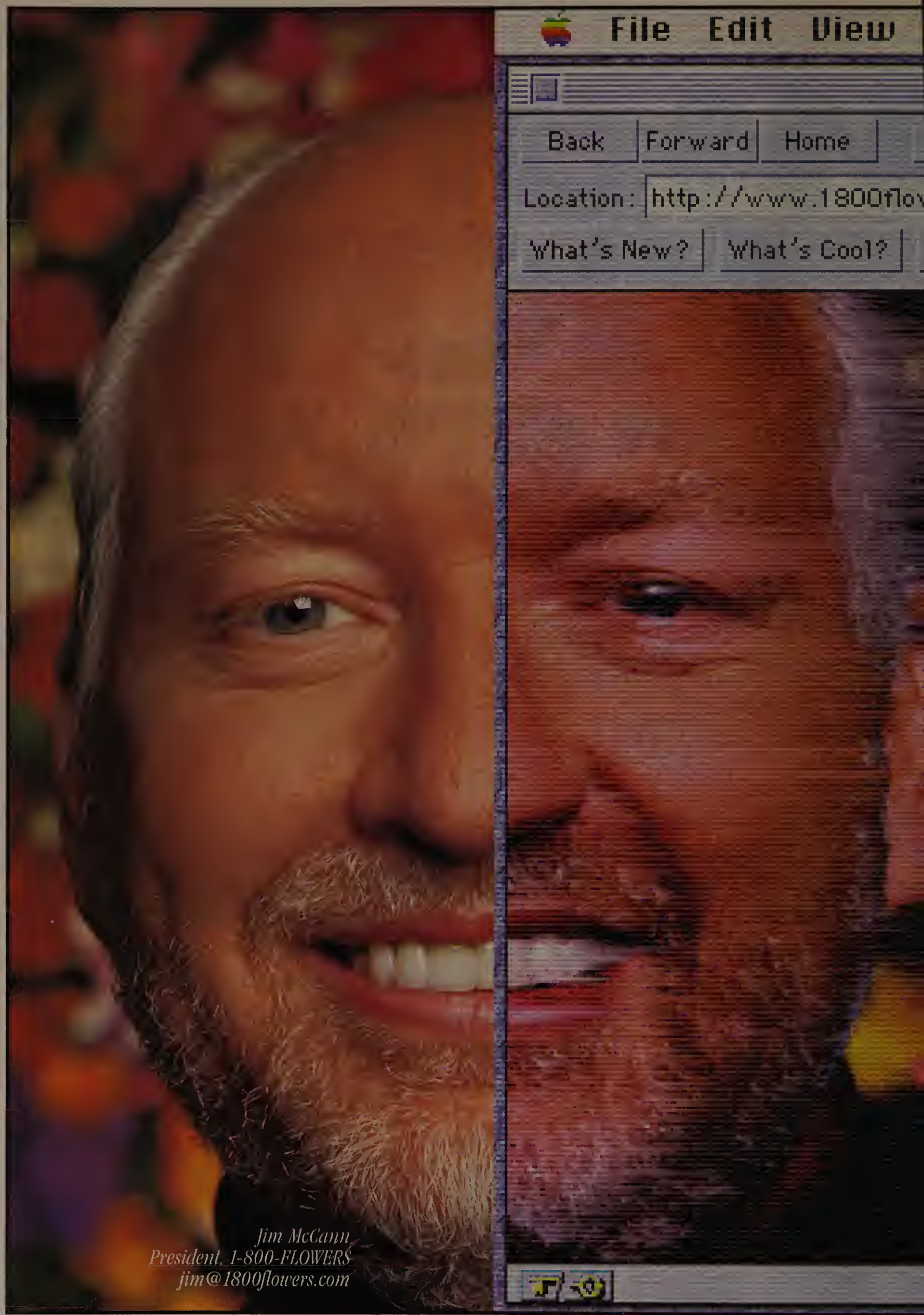

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Let's Keep It Simple Spreadsheet

NEW APPROACH TO SPREADSHEETS USES GRAPHICAL PROGRAMMING STYLE

THE DEVELOPERS OF LET'S KEEP It Simple Spreadsheet (LKISS) modestly claim to have the first new approach to spreadsheets in ten years. Actually, the current model for spreadsheets has dominated for longer than that: Microsoft Excel 5.0 is recognizably a direct descendant of VisiCalc for the Apple II from the early 1980s. But LKISS is not only a different type of spreadsheet, it's also simple, fast, and fun to use.

And Now for Something Completely Different . . .

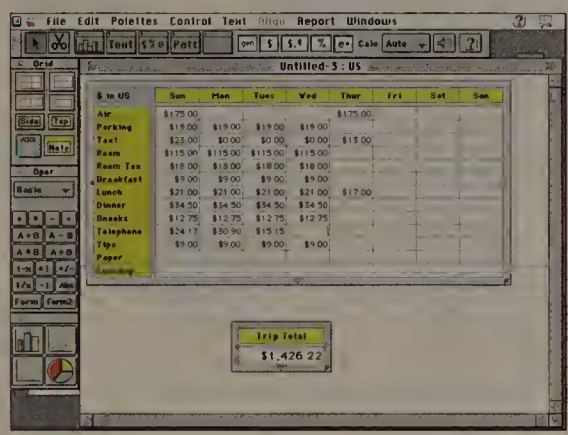
Most spreadsheets give you a grid for entering numbers and labels, and rules defining a syntax for formulas. Typically, the grid displays equation results, not formulas. LKISS, on the other hand, has a workspace with a tool bar and several palettes of icons. You create calculations by dragging objects, including columns, rows, cells, labels, and mathematical operators, from the palettes onto the workspace. Then you connect the objects (according to the connection rules, which you will find only with considerable searching of the just-adequate manual), and LKISS performs the calculations.

For example, say you want to add two columns of numbers. First you drag two column icons onto the workspace. (Unlike with most palettes, selecting an icon doesn't let you use the tool it represents; you must drag each icon individually.) You can resize the columns by dragging a corner handle. Then you drag the A+B operator icon into the workspace and connect it to the columns. Attach a cell icon to the operator, and the single cell expands to the size of your columns, its cells filled with the addition results.

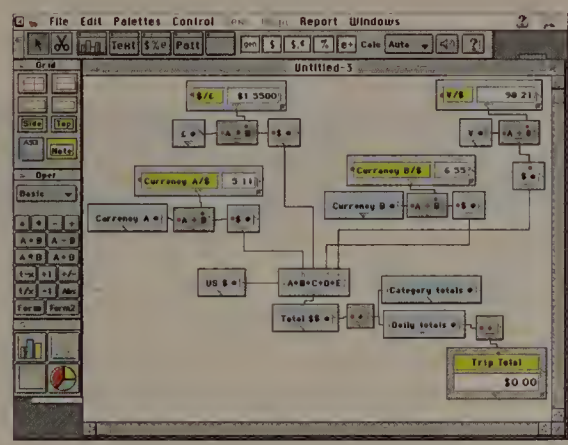
If you drag-extend an input column, the results column automatically extends itself as well. That's one of LKISS's nicest tricks. It works for 2-D grids as well, so you can take a table and readily perform calculations on everything in it.

LKISS uses two kinds of icons for formulas—one for single variables (where you perform the same calculation on all the numbers in a table) and the other for two variables (where you combine two tables). For example, you could add two columns of numbers by using a single table of two columns and the + operator, rather than using two separate columns and the A+B operator as in the example above.

LKISS has no need for cell addresses, allowing you to focus on your calculation,



A Simple Report LKISS is good at producing clean reports, hiding most details.



Simple Report Logic This is the "program" underlying the other screen shot. As you might expect, big projects produce lots of arrows and icons.

not on the cell-address conventions and address-based formulas found in most spreadsheets. This approach lets you set up medium-size problems in a few minutes with minimal effort.

LKISS provides a big solutions library that covers not only every financial calculation you or your small business are likely to face, but different types of scientific and statistical computing as well.

Trouble in Paradise

This is of course a difficult market to enter, as the bleached bones of Claris Resolve, Informix Wingz, and Lotus 1-2-3 for the Mac along the spreadsheet wagon trail testify. And LKISS has a few strikes against it that probably will keep it out of big-business use. Charting is fast and easy, but there are only four types (bar, pie, line, scatter). If everyone read data-graphing authority Edward Tufte, they'd settle for simple charts, but the real world can't seem to get enough wacky chart types. Also, LKISS's unique approach means that you cannot automatically convert address-based formulas to or from LKISS's address-free logic. And some familiar Macintosh commands need attention—sometimes Select All picks out a grid, sometimes it picks everything you've done; Delete won't erase in a cell unless you drag-select the contents. Finally, LKISS takes 8MB of RAM.

But LKISS is slick at handling clip art, backgrounds, colors, and other formatting niceties, and the palette-based graphical programming means that for most single-page calculation problems, you can set up an error-free spreadsheet in about one-third the time it would take in Excel. That's the payoff of LKISS's clear and logical approach. The downside is that LKISS will never be Citibank's choice for currency arbitrage programming—a look at the spaghetti in "Simple Report Logic" hints at what happens when spreadsheets start to grow.

The Last Word

I love this program, despite its limitations. If you're an old Excel hand with libraries of macros, LKISS is not likely to convert you, but if you don't have much spreadsheet practice, LKISS will provide faster results than a traditional spreadsheet. Casady & Greene deserves a round of applause for backing innovation at a time when the phase "the same old thing, only bigger" pretty much sums up most new programs.—CHARLES SEITER

RATING: ★★★★/7.8 **PROS:** Quick setup of small to medium problems; fast recalculation and graphing; fun to use. **CONS:** Limited graphing and export options. **COMPANY:** Casady & Greene (408/484-9228, *http://www.casadyg.com*). **LIST PRICE:** $189.95.

ISDN Routers

INTERNET ACCESS VIA ISDN IS EASIER WITH NETOPIA

ASCEND'S PIPELINE 25 AND PIPELINE 50 and Farallon's Netopia 440 ISDN routers all let you connect Ethernet LANs to TCP/IP or AppleTalk remote networks—including the Internet—via ISDN at up to 128 Kbps. But the Netopia includes Mac-centric features that make it much easier to set up and maintain, as well as software and instructions specifically for Internet setup. As a result, the Netopia is a better buy for Macintosh users.

Out-of-the-Box Experience

The three routers use ISDN for their wide area network (WAN) connection, and Ethernet to connect to your LAN. The Netopia has two built-in EtherWave ports, which let you connect to either a traditional 10BaseT hub or a Mac-style daisy-chained Ethernet LAN. The Netopia also has LocalTalk for connecting non-Ethernet Macs and peripherals.

Initial setup is straightforward: the products include quick-start guides and have fast-path initial setup screens that let you easily enter essential configuration parameters all at one time. The configuration interfaces use character-based menus and forms—functional if not elegant. You can get any of the products up and running in minutes.

Only the Netopia, however, bundles everything a Mac user needs to get started: a Mac serial cable plus terminal-emulation software (David Alverson's Zterm 1.0) for initial configuration, and Mac software (Netscape's Navigator 1.12, Network TeleSystems' Telnet 1.0, and Qualcomm's Eudora Light 1.5.3). The Pipelines don't come with a Mac serial cable, although they include a 9-to-25-pin adapter that lets you use a Mac modem cable for initial configuration. Also, only the Netopia manual has specific instructions for Internet setup.

Features Galore

The routers use dial-on-demand, which transparently dials a connection whenever packets need to go out of the network. They also offer dynamic bandwidth management, which combines two ISDN B channels using Multilink PPP (MPP) to achieve 128-Kbps data rates, and they support interoperable STAC data compression that can improve throughput dramatically. The Pipeline units have both multiprotocol bridging—you can transport any protocol, including IPX and AppleTalk, across the WAN—and IPX routing. This makes them well suited for mixed Mac-and-PC networking, but bridging doesn't let you move these protocols over the Internet. The Netopia lacks bridging but supports AppleTalk routing and Apple's AURP tunneling protocol, which can move AppleTalk over TCP/IP connections.

SUZANNE ROADY

Ascend's Pipeline 25 (top) and Farallon's Netopia 440.

The three products have a common management feature set network administrators will appreciate: remote management via Telnet or SNMP, packet filtering, multilevel password security, multiple connection profiles, and upgradable firmware. The Pipeline units can optionally log diagnostic information to a remote Unix host. The Netopia includes DHCP and MacIP address serving to assign IP addresses to host computers dynamically. The Netopia also has a built-in time and date clock.

Networks are never problem-free, so diagnostic tools are important. The Pipeline units have 5 minimalist LEDs; the Netopia does much better, with 15 well-organized, multicolor LEDs that show detailed ISDN and Ethernet activity and error states. One novel feature of the Netopia is useful for remote problem diagnosis and support: a slot for a PC Card modem lets you dial in and access configuration and control menus.

Put to the Test

The routers fared well in throughput tests, moving large files at nearly 16 Kbps, ISDN's theoretical maximum speed. With compression turned on, they easily doubled that throughput to 32 Kbps on compressible text files. All three routers operated flawlessly with typical ISDN gear used by ISPs, and with each other.

During testing, however, the Pipeline 25 exhibited problems on busy networks, possibly because of the demand of supporting analog devices through its two built-in POTS (plain old telephone service) ports, which worked well in our tests. Ascend recommends not using the Pipeline 25 on LANs with more than a few other active devices. For home-office users this may not be a problem, and the Pipeline 25's two analog ports are exceedingly useful in home-office applications.

The Last Word

If you need to interconnect a mixed PC-and-Mac file-sharing network, or need analog phone ports, the Pipeline products will work well. But if your network consists of TCP/IP with Mac file sharing, Farallon's Netopia gives you unparalleled ease of use and versatility.—MEL BECKMAN

Netopia 440

RATING: ★★★★/8.6 **PROS:** ISP-ready setup; EtherWave and LocalTalk ports; IP, AppleTalk, and AURP routing; DHCP and MacIP address serving. **CONS:** No bridging; no IPX routing. **COMPANY:** Farallon (510/814-5000, *http://www.farallon.com*). **LIST PRICE:** $1475.

Pipeline 25

RATING: ★★★/6.8 **PROS:** Dual analog phone ports; IP routing and multiprotocol bridging. **CONS:** No Mac-specific setup aids; no AppleTalk routing; slow performance on a busy network. **COMPANY:** Ascend Communications (510/769-6001, *http://www.ascend.com*). **LIST PRICE:** $895; with IP routing and compression $1495.

Pipeline 50

RATING: ★★★★/7.1 **PROS:** IP routing and multiprotocol bridging. **CONS:** No Mac-specific setup aids; no AppleTalk routing. **COMPANY:** Ascend Communications (510/769-6001, *http://www.ascend.com*). **LIST PRICE:** $1695.

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Frame-Relay and ISDN Routers

KEEPING YOUR INTERNET-ACCESS OPTIONS OPEN

ASCEND'S PIPELINE 130 AND KENtrox's Pacesetter (formerly Skyline Technologies' Veloce) routers support both low-cost ISDN connections up to 128 Kbps and pricier frame-relay and leased-line dedicated connections up to T1 speed (1544 Kbps), letting you get your feet wet at inexpensive dial-up speeds while keeping your options open for more-expensive high-speed dedicated access.

Packaged for the Masses

Both routers connect to your LAN via Ethernet, using either 10BaseT or an AUI adapter. For the high-speed WAN connection, however, Pacesetter has a V.35 serial port, which requires a separate external CSU/DSU, while Ascend builds a CSU/DSU right in, letting you attach the router directly to a frame-relay or leased T1 jack. The $800 you'd save by buying the Pacesetter instead of the Pipeline 130 is enough to pay for an external CSU/DSU, but having everything you need in one unit is awfully convenient. An offsetting advantage for the Pacesetter is its wider range of WAN options: you can connect to low-end 56-Kbps digital circuits, or even a modem, through the V.35 serial port; the Pipeline's built-in CSU/DSU works only with T1 circuits.

While not built specifically for Macs, both products support AppleTalk bridging, making them a good solution for mixing Internet and interoffice LAN access. Neither product includes any Mac software. Both routers have clearly written user guides for nontechnical users, but the Pipeline has a hefty advanced reference manual; Kentrox requires that you order detailed documentation separately.

Initial setup is straightforward. You configure both units using character-based menus through a serial port attached to the Mac's modem port. (Neither unit includes the necessary Mac serial cable or adapter; the Pipeline is also missing straight-through Ethernet and T1 cables.) The Pipeline has a single fast-path initial setup screen that lets you easily set up an ISDN connection; to set up a frame-relay connection you must visit a dozen separate screens. For the Pacesetter, you can choose one of six fast-path configurations for various combinations of Internet or LAN access over ISDN or frame-relay connections. If you understand the technology, you can have the Pacesetter operational in minutes; the Pipeline requires at least an hour of poring through the manuals first.

Inner Workings

Both routers support dial-on-demand ISDN to dial connections transparently. Both can also combine two ISDN B channels using Multilink PPP (MPP) to achieve 128-Kbps data rates, or up to four times that throughput (two times is more realistic) using interoperable STAC data compression. Multiprotocol bridging lets you transport any protocol, including IPX and AppleTalk, across the WAN. Alternatively, you can use a combination of IP/IPX routing and AppleTalk bridging for mixed Mac-and-PC networking.

SUZANNE ROADY

Kentrox's Pacesetter (top) and Ascend's Pipeline 130.

You can remotely manage either router via Telnet or Simple Network Management Protocol (SNMP), although the Pacesetter permits only one Telnet session at a time, which can lock you out of the router should a session get hung up. Both also support packet filtering, multilevel password security, multiple connection profiles, and upgradable firmware. The Pipeline can optionally log diagnostic information to a remote Unix host. For Internet connections, the Pacesetter supports dynamic IP-address translation. It also has a maximum connect time limit—a useful cost-control feature for dial-up connections.

The Pipeline has five LEDs showing power, Ethernet activity, whether a connection is up or not, and a generic problem light. These lights don't tell you whether cables are connected properly, what kind of connection is operating, or whether data is flowing. The Pacesetter has lights for all these conditions.

The routers fared well in throughput tests, easily moving data at full line speed and interoperating well, both together and with WAN gear used by ISPs. Both products let ISDN back up a high-speed WAN connection: if a WAN link fails, the ISDN link automatically takes over. The Pipeline doesn't automatically return to the WAN connection when it resumes operation—you must manually command a WAN reconnect. The Pacesetter reconnected without human intervention.

The Last Word

Both products ignore Mac end-user convenience, for which I hereby soundly rebuke them. But for getting started with a fast digital dial-up WAN connection, either of these units will do you proud. When you're ready for dedicated high-speed access, the Pacesetter is more versatile and easier to configure than the Pipeline 130, though you must invest in an external CSU/DSU.—MEL BECKMAN

Pacesetter

RATING: ★★★/6.9 **PROS:** IP/IPX routing and AppleTalk bridging over frame-relay, ISDN, or leased lines; quick setup aids; dial-out time limit; IP-address translation; data compression. **CONS:** No Mac-specific setup aids; no AppleTalk routing. **COMPANY:** ADC Kentrox (503/643-1681, *http://www.kentrox.com*). **LIST PRICE:** $1199.

Pipeline 130

RATING: ★★★/5.9 **PROS:** IP/IPX routing and AppleTalk bridging over frame-relay, ISDN, or leased lines; built-in CSU/DSU; data compression. **CONS:** No Mac-specific setup aids; no AppleTalk routing; limited diagnostic indicators. **COMPANY:** Ascend Communications (510/769-6001, *http://www.ascend.com*). **LIST PRICE:** $1995.

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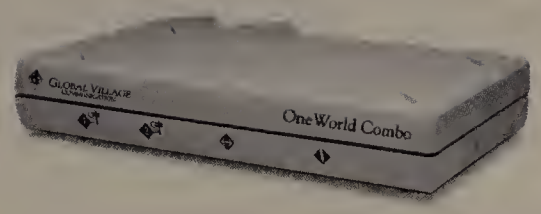

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Font Managers

SUITCASE AND MASTERJUGGLER VIE FOR SUPERIORITY

ONCE UPON A TIME, SUITCASE 2.0 was my font manager of choice. As the years passed and the program received decidedly lackluster updating, I eventually switched to Alsoft's MasterJuggler. Now, with Symantec's release of version 3.0.1, Suitcase is completely redesigned and up-to-date. But Alsoft, close on Symantec's heels, just released MasterJuggler Pro 2.0. Both programs manage fonts better than before, but there is as yet no happy ending to this story: neither is an unqualified success.

The Basics

The Mac OS requires that you store all your fonts in the System Folder's Fonts folder; if you want to add or remove fonts, you must move them into or out of the Fonts folder (or turn them on or off with an extension manager like Casady & Greene's Conflict Catcher) and restart your Mac. With Suitcase and MasterJuggler, however, you can store fonts anywhere, group them into quick-loading sets, and add or remove them without having to restart.

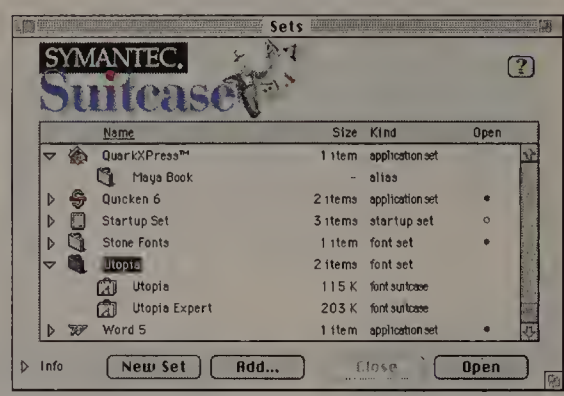
Both Suitcase 3 and MasterJuggler 2 are Power Mac native (and speedy on a Power Mac); handle PostScript, TrueType, and QuickDraw GX fonts; resolve font ID conflicts automatically; and can display text samples for any font. Both now consist of an extension and a separate application, manage sounds as well as fonts (MasterJuggler also manages desk accessories and function-key files), and compress sounds and fonts to conserve hard-drive space. Both also worked without a single complaint on my extension-laden Power Mac 7500.

Different Approaches

Beyond those basic similarities, the programs actually work quite differently. Suitcase stores all the font sets you define in a single Sets window (see "Neatly Packed Suitcase"); here you can create, edit, rename, delete, open, and close sets. Because you can't misplace your sets and they're always all in one place, managing them in Suitcase is pretty intuitive. The Fonts window displays either the currently open fonts or one of several subsets.

In MasterJuggler, sets are actual files, and the disadvantages to this approach compared with Suitcase's are many. Like any documents you create, MasterJuggler sets are easily misplaced and easily confused with items having similar names. You can't rename or delete sets, and you can't view a complete list of sets unless they're all stored in one folder.

Another area where the two utilities part company is drag and drop. Although both let you drop fonts on the application icon to open them, in MasterJuggler you can use that technique to open sets and close fonts and sets as well. On the other hand, with Suitcase you can drag and drop within or into a Suitcase window



Neatly Packed Suitcase In Suitcase 3's main window, you can expand, collapse, and sort font sets by name and size, like files in the Finder.

to add an alias of a font or set or to convert a font-filled folder into a new set. If your font collection is neat and organized, Suitcase's drag and drop lets you create most of the sets you need quickly and easily. Unfortunately, because sets and their aliases are difficult to distinguish in Suitcase, it's also easy to drag and drop your way into an incomprehensible tangle of sets within sets.

In both MasterJuggler and Suitcase, you can manually open any font or set at any time. In Suitcase, a special Startup Set opens automatically at start-up, and you can create application sets that open automatically when you launch a specific program and, if you're handy with AppleScript, document sets that open when you open a particular document. MasterJuggler, on the other hand, doesn't have application-linked sets and is not AppleScriptable; although it can open specified fonts on start-up, this "start-up set" is not a real file and is awkward to modify. Conveniently, however, MasterJuggler automatically reopens all the fonts you had open prior to a crash or power failure.

Extra, Extra

One of MasterJuggler's strong points is its suite of additional font tools. It can check for corrupted fonts and missing PostScript files (automatically or on request), gather fonts for a trip to the service bureau, locate and permanently resolve font ID conflicts, combine the members of a font family into a single menu entry, and print samples of your installed fonts. Numerous other features—including a pop-up menu of currently open windows and the ability to attach sounds to Finder actions—have nothing to do with font management and are mostly second-rate.

Suitcase has none of MasterJuggler's useful extras. It does offer a WYSIWYG font-menu option, but other programs (such as Now Utilities) do it better. And in contrast to MasterJuggler, Suitcase's alert messages are vague and unhelpful.

The Last Word

Overall, I much prefer Suitcase 3's modus operandi and its application-linked font sets. But MasterJuggler's ability to detect corrupt or missing files and its more helpful alert messages are equally appealing. I wish I could have all these features in my font manager. But since I can't, the age-old debate of Suitcase versus MasterJuggler remains, in my opinion, unresolved.—ROBERT C. ECKHARDT

MasterJuggler Pro 2.0

RATING: ★★★/6.0 **PROS:** Helpful alert dialogs; checks for corrupted and missing fonts; useful set of font tools. **CONS:** Awkward font management; minimal drag and drop. **COMPANY:** Alsoft (713/353-4090). **LIST PRICE:** $89.95.

Suitcase 3.0.1

RATING: ★★★/6.1 **PROS:** Easy font-set management; well-designed drag and drop; application-linked sets; AppleScriptable. **CONS:** Vague alert messages; no ancillary font tools. **COMPANY:** Symantec (503/334-6054, *http://www.symantec.com*). **LIST PRICE:** $69.95.

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APPLE CRISP

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Diamond Scan 17HX	17"/15.7" DVI*	1600 x 1200/65 Hz NI	H:30-82 kHz, V:50-130 Hz	$849.00
Diamond Scan 20H	20"/18.6" DVI*+	1600 x 1200/65 Hz NI	H:30-82 kHz, V:50-152 Hz	$1,699.00
Diamond Scan 20M	20"/18.6" DVI*	640 x 480/66 Hz NI	H:15-38 kHz, V:45-90 Hz	$1,699.00
Diamond Scan 20LP	20"/18.6" DVI*	640 x 480/66 Hz NI	H:15-38 kHz, V:45-90 Hz	$1,745.00
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Apple Network Server 700

STUNNINGLY FAST AND BRUTALLY ROBUST TOWER

APPLE'S NETWORK SERVERS 700 and 500 mark Apple's first serious entry into the enterprise server market. I tested the Network Server 700 and found it easy to set up and use, but it lacks some important software (AppleShare) and sometimes requires laying-on-of-hands by Unix gurus. Overall, though, these fast, capable tower systems are competitive with other Unix-based servers, managing to meld the power of Unix with Macintosh ease of use.

The Network Server doesn't run the Mac OS; instead it uses IBM's version of Unix, called AIX, on a PowerPC 604 processor. (The 500 uses the 132MHz 604, and the 700 uses the 150MHz version.) The double-wide tower system is specially constructed for corporate environs: the lockable, rollable cabinet with six front-mounted hot-swappable drive bays has six PCI slots, optional hot-swappable dual power supplies, and up to 512MB of RAM and 256GB of disk space. I tested a Network Server 700, with 48MB of RAM, two 4GB fixed internal disks, CD-ROM drive, 4mm tape backup, and four Ethernet cards plus built-in Ethernet.

Setting Up the Server

The machine comes with no software installed; you install and configure the basic software as part of the setup. Apple supplies a CD containing the AIX operating system, top-notch documentation explaining every aspect of installation, and five CDs of trial software including Helios Ethershare and PCShare, IPT uShare and CanOPI, Legato Data Backup, Legato Networker, and API PowerChute UPS monitoring. Basic installation takes about an hour and requires only a few stops at configuration screens. Those screens, however, are Unix X Window sessions that are not exactly intuitive to Macintosh users. It's essential to read Apple's step-by-step procedures carefully.

After installing the software, you're ready to reboot the machine and—guess what?—serve up absolutely no Mac information. While Apple's network-server software includes AIX, AppleTalk, and various system-administration tools, it does not include AppleShare. You must buy one of the AppleShare packages offered on the trial-copy CDs, with the price based on the number of users you intend to serve.

To turn a Network Server into a fully functioning AppleShare server, you must configure and initialize AppleTalk (in either single-port nonrouting or multiport routing mode), initialize and partition disk storage, and install an AppleShare server product. Alas, the third-party installers require you to type in true Unix commands on the keyboard and screen connected to the server.

ROBERT PERRY

Management Made Easy

For disk management, however, Apple supplies two excellent AppleTalk-based configuration tools that run on any Macintosh connected to the network. CommandShell lets you remotely execute Unix commands teletype-style without first installing and configuring the TCP/IP protocol Unix servers typically require. And the Disk Management Utility allows you to reconfigure and manage disk drives on any Network Server remotely. Both tools can manage any number of remote Network Servers at once.

The Disk Management Utility includes Logical Volume Manager (LVM), which lets you combine multiple physical disks into a single logical volume. Logical volumes have better reliability and performance than a single physical disk could deliver. LVM provides a number of sophisticated options not found in traditional Mac OS–based file servers: RAID mirroring and striping for hot-swap disk-failure recovery, journaling to ensure directory integrity in the event of a system failure, allocation policy to tune performance, and write-verify for early disk-problem detection.

Even though LVM provides better data reliability than the Mac OS and lets you recover gracefully from data errors when they do occur, regular offline backups are still essential. Unfortunately, backup is not a chore readily done through Apple's remote management tools. AIX includes a backup utility accessible via Unix commands, but you can't easily set this up to run automatic backups. For that, you need to buy a third-party backup product. And although you can automate backing up, restoring your backups requires a good understanding of Unix file systems.

Because the Network Server is binary compatible with IBM's RS/6000 line, it can run AIX-compatible Unix applications alongside AppleShare. I downloaded, installed, and launched Netscape's WWW Commerce Server directly from the Internet in just a few minutes. AIX includes X Window support, so you can remotely operate any Unix application using a Mac-compatible X Window terminal emulator such as Apple's MacX, NetManage's XoftWare, Tenon's Xten, or White Pine's Exodus.

The Last Word

The Network Server makes Apple a contender in the enterprise server market by delivering speed, capacity, reliability, and expandability far beyond what's possible with any Mac OS–based server. Apple's pricing is competitive with that of similarly equipped Unix systems, including IBM's RS/6000. Yet unlike with those systems, you don't need to study Unix for weeks to successfully install Apple's Network Server 500 or 700.—MEL BECKMAN

RATING: ★★★★/8.1 **PROS:** Rugged hardware; fast processor and disk; highly expandable; Mac-based administration tools. **CONS:** No built-in AppleShare; some knowledge of Unix required. **COMPANY:** Apple Computer (415/996-1010, *http://www.apple.com*). **LIST PRICE:** $12,500.

MIDI Sequencers with Digital Audio

POWERHOUSE MUSIC PROGRAMS ADD DSP FEATURES

OPCODE'S STUDIO VISION PRO 3.0.3 and Mark of the Unicorn's Digital Performer 1.71 let you record, edit, and play both MIDI data transmitted by music synthesizers and sound modules, and digital audio (acoustic guitars, vocals, horns), combining the best of both worlds.

The programs' MIDI sequencing features are closely matched and extremely powerful. Both provide the industrial-strength sequencing and editing features professional musicians require. Studio Vision's approach to MIDI sequencing makes it better suited to live-performance applications, while Digital Performer generates superior music notation. (For details on these programs' MIDI features, see the reviews of their MIDI-only siblings, *Macworld*, March 1995.)

The big news in recent upgrades of Studio Vision Pro and Digital Performer is in the audio department. Both programs now provide digital signal processing (DSP) functions that enable you to transpose audio, change its tempo, and so on. While Studio Vision Pro does more, Digital Performer does better.

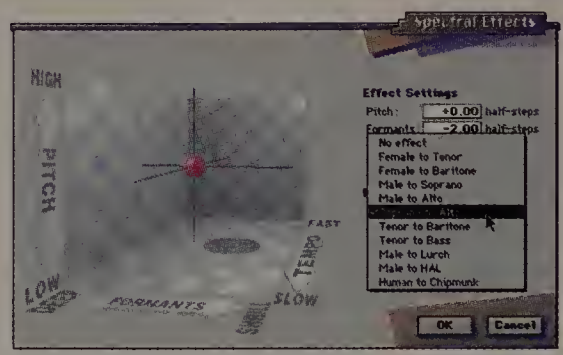
Different Hardware Appetites

Both of the programs demand at least a 68040 Mac with 16MB of memory, but their hardware requirements for recording and playing audio differ. Studio Vision Pro is the most versatile—it can record and play audio on any Mac with 16-bit sound and Apple's Sound Manager 3.X, a list that includes all Power Macs, the PowerBook 500 series, and the Quadra 660AV and 840AV. Studio Vision Pro also supports digital-audio cards such as Digidesign's Audiomedia II and Pro Tools families, as well as Yamaha's CBX-D5 and CBX-D3 dedicated hard disk recorders. Digital Performer supports Digidesign's family of digital-audio cards, but it does not support Sound Manager–based software-only audio.

Audio Audition

Want to transpose a horn solo to a different key? Want to duplicate and then transpose a vocal track to create a duet? Need to slow down a sampled drum groove to meet a tune's tempo requirements? Both programs' DSP features can handle these chores and others.

Studio Vision Pro does the most thorough job of marrying the MIDI and audio worlds, thanks to its Audio-to-MIDI and MIDI-to-Audio commands. With them, you can convert a singer's off-key note to MIDI, correct the error, and then convert the MIDI back into audio. Or you can create MIDI data from a guitar solo and then create a synthesizer track that plays along with it. Studio Vision Pro's capabilities are amazing, but expect to spend time tweaking for good results. And note that the conversion features work with monophonic audio only—that is, you can convert a solo singer's performance into MIDI, but not a quartet's.



Shift That Pitch Digital Performer's Spectral Effects dialog box is the gateway to the program's DSP power. By dragging the red ball within the three dimensions shown here, you can shift pitch, make audio sound more shrill or more deep, and change its tempo. You can also enter numeric values in the text boxes and choose from several presets.

When it comes to altering audio rather than converting it, Digital Performer is the hands-down winner. Its TrueDSP technology transposes audio without introducing the Chipmunks-like artifacts that plague other audio programs, including Studio Vision Pro. The Spectral Effects command also includes a series of presets that enable you to turn sopranos into altos, for example. The results are astonishing. (I've posted sample recordings on my Web site, at *http://www.heidsite.com/*.)

Mark of the Unicorn has packaged this DSP power in one of the most exquisitely functional dialog boxes I've ever seen (see "Shift That Pitch"). In general, Digital Performer's gorgeous interface is more enjoyable to work with than that of Studio Vision Pro, where some crudely designed dialog boxes and bizarre keyboard shortcuts get in the way of the program's power.

Digital Performer's DSP features are also more convenient to use. Unlike Studio Vision Pro, Digital Performer can crunch an audio track in the background, even while you play and record additional tracks. A Background Processing window provides status reports and lets you pause, cancel, and reorganize tracks waiting to be processed.

The Last Word

If you want to record and play digital audio without having to buy a card, or you want to tread the edge and experiment with MIDI-audio conversion, Studio Vision Pro is the program to buy.

If you have digital-audio hardware and anticipate performing a lot of pitch shifting and time scaling, get Digital Performer. It lacks MIDI-audio conversion and a few other audio goodies, but it does an unparalled job of altering pitch and tempo.—JIM HEID

Digital Performer 1.71

RATING: ★★★★/7.5 **PROS:** Pitch- and tempo-shifting deliver superb results; superior notation editing; smooth, attractive interface. **CONS:** Requires dedicated hardware for audio recording and playback; copy protected. **COMPANY:** Mark of the Unicorn (617/576-2760, *http://www.motu.com/*). **LIST PRICE:** $895.

Studio Vision Pro 3.0.3

RATING: ★★★★/7.2 **PROS:** Works without dedicated audio hardware on most current Macs; unique audio-MIDI conversion features; extremely powerful. **CONS:** Some interface rough edges; audio pitch-shifting introduces artifacts; audio-MIDI conversion requires extensive tweaking for good results; copy protected. **COMPANY:** Opcode Systems (415/856-3333, *http://www.opcode.com/*). **LIST PRICE:** $895.

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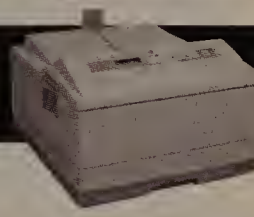

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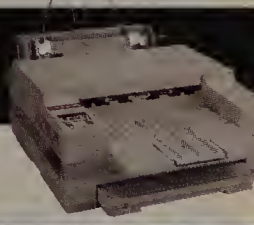

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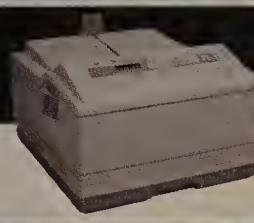

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Color QuickCam

LOW-COST CAMERA FOR PASSABLE DIGITAL VIDEO

THE CONNECTIX COLOR QUICKCam is an inexpensive digital video camera that lets you capture 24-bit still images and 16-bit movies with just about any Macintosh, including a PowerBook. (Connectix recommends at least a 68040 for the best frame rate, but any 68020-or-better computer is compatible with the QuickCam.) The video quality is marginal and, unlike the original gray-scale QuickCam, this one requires a separate microphone to record audio. But at less than half the price of other digital cameras—still or video—it's worth a few sacrifices.

The Color QuickCam has no storage capacity; it captures movies and still images directly to your computer's hard drive. Unlike other tapeless video cameras, however, the Color QuickCam digitizes images (without requiring an AV board) and transfers them to your computer via a 6-foot serial cable. The camera's small proportions—it's about the size and shape of a baseball—make it highly portable. And because it draws its power from the ADB port, you can use it on the road without hunting for electrical sockets.

Connectix uses a proprietary compression scheme (VIDEC) to capture movies with as many as 32,000 colors. This is a colossal improvement over the first QuickCam, which was limited to 16 shades of gray. Using the highest-compression, lowest-quality setting, I captured quarter-screen (320-by-240-pixel) movies at better than 10 frames per second (fps); that's one-third the number of frames you'd see on broadcast television. Connectix claims you can reach 30 fps on Power Macs if you reduce the frame size to 160 by 120 pixels, but I wasn't able to do better than 20 fps.

The Color QuickCam comes with a 5.7mm lens that you can focus manually on objects as close as 1 inch. The camera automatically compensates for brightness, and you can rotate the camera and screen image 90 degrees to shoot portrait movies. The QuickMovie software lets you adjust the brightness and color settings, though no amount of tweaking can improve the narrow dynamic range and blown highlights. But the worst problem is the brightly colored dots that infest movies in low-light conditions. The only solution is to switch to overhead fluorescent lights or move to a location with better daylight.

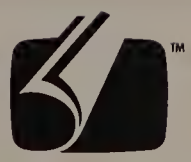
Trial by Fire The Color QuickCam's grainy, low-resolution pictures can't match those from a video camera cabled to an AV board, but they're good enough to communicate basic ideas. For example, if these frames were accompanied by the audio message "I am in the company of a fire-breathing dinosaur," you could quickly ascertain that I was in no immediate danger.

The Color QuickCam also captures still images, which you can save in TIFF, PICT, or JPEG format. You can shoot 24-bit pictures as large as 640 by 480 pixels, the same resolution as Apple's QuickTake 150. The QuickPICT software has a self-timer so you can join the picture, and you can manually set the exposure time for dark scenes. The trendiest feature is Auto-Capture, which lets you shoot images periodically and save them as JPEG files—perfect for creating a live Web portrait of your world. You can even specify the days and times during which the camera is active.

The Last Word

If you don't own an AV Mac or you want to add AV capabilities to a PowerBook, the Color QuickCam is the least expensive—and in some cases the only—digital camera you can buy. If you own a Power Mac 8500 or some other AV model, however, you may be better off plugging a camcorder into your computer's video-in jack.—DEKE McCLELLAND

RATING: ★★★/6.5 **PROS:** Inexpensive and portable; captures 16-bit movies and 24-bit still images; lets you automatically update Web graphics. **CONS:** Narrow color range; low lighting results in random noise; bring your own mike. **COMPANY:** Connectix (415/571-5100, *http://www.connectix.com*). **LIST PRICE:** $299.



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Sculpt 3D 4.1

HIGH-END 3-D FOR THE MAINSTREAM

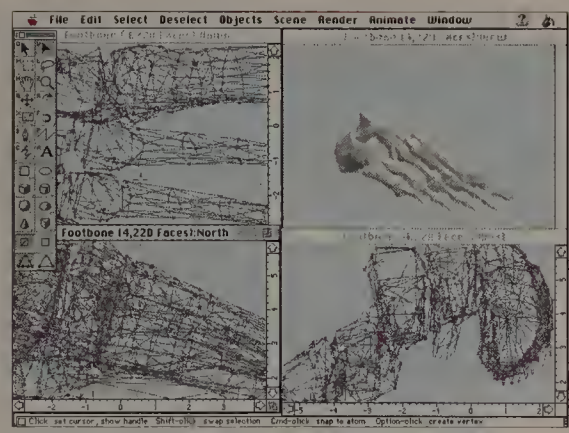
DESPITE EXCELLENT MODELING and rendering tools, Sculpt 3D's price and arcane interface have limited its appeal to a loyal following of industrial designers and architects. With the latest version, the program is ready for the mainstream: not only has Byte by Byte integrated standard Mac-interface elements and dropped the price, but it's added an animation package that used to be sold separately. The result is an excellent, if idiosyncratic, 3-D design program that presents a more familiar face to Macintosh users and is less intimidating to novices.

Sculpt 3D still marches to the beat of its own drummer, though, starting with the way it builds objects. In most 3-D programs, a vertex is simply a handle on an object's surface, such as a corner on a cube or a point on a faceted sphere. In Sculpt 3D, vertices are basic construction elements that can be placed anywhere in space. Join two vertices with a line and you create an edge; connect three into a triangle and you get a face. The program gives you complete control over the contours of an object, letting you select elements individually. Sculpt 3D doesn't *force* you to work at this nuts-and-bolts level, but it does let you build complicated model surfaces one vertex at a time. In practice, this CAD-like object structure provides exceptional modeling flexibility.

Sculpt 3D lets you build curved objects using various spline types and extrude, lathe, and loft 2-D outlines into 3-D objects. You can also apply Boolean functions to 3-D objects by trimming the surfaces of the intersecting shapes, or produce standard shapes such as cubes, spheres, and cylinders. These shapes share Sculpt 3D's object structure, making them fully editable starting points for more complex constructions.

Instead of the earlier versions' menu commands, Sculpt 3D 4.1 puts its object-building tools on an unobtrusive palette reminiscent of the original MacDraw interface. But although interface enhancements have made Sculpt 3D more accessible, the program retains its idiosyncrasies. For example, object-editing operations are accessible only from the Actions submenu of the Scene menu.

Sculpt 3D can produce exquisite ray tracings and has excellent controls for lighting and for calibrating surface attributes, such as reflectivity, transparency, and roughness. You can edit the program's built-in procedural textures by selecting attributes from pop-up menus, while graphical controls let advanced users fine-tune individual surface effects according to the angle of view. The dialogs may look simple, but don't be fooled; Sculpt 3D's texture-editing controls are as sophisticated as any of its competitors'.



Skilled Modeler Excellent modeling tools make Sculpt 3D suitable for complex, detailed modeling, such as this anatomical model of a human foot.

The same can't be said for Sculpt 3D's animation component, which is suitable for architectural-style fly-throughs but not much else. You can move the camera (or its target point) along a path through the scene, but you can't move individual objects or animate their surfaces.

This version of Sculpt 3D lacks a printed manual, but it does include a tutorial and a thorough online manual. Given the program's price reduction, having to print your own hard copy is only a minor inconvenience.

The Last Word

If you're willing to be somewhat accommodating in your modeling style, Sculpt 3D will reward you with exceptional tools suitable for complex modeling tasks. But with its new, lower price and simpler interface, Sculpt 3D is no longer for techies only.—CARLOS DOMINGO MARTINEZ

RATING: ★★★★/7.0 **PROS:** Excellent modeling and rendering tools; improved interface; lower price. **CONS:** Interface still needs improvement; weak animation component. **COMPANY:** Byte by Byte (512/305-0360, *http://bytebybyte.com*). **LIST PRICE:** $495.

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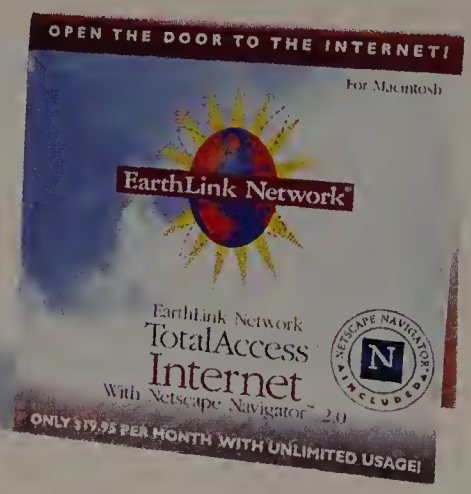

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Ready,Set,Go 7.0.2

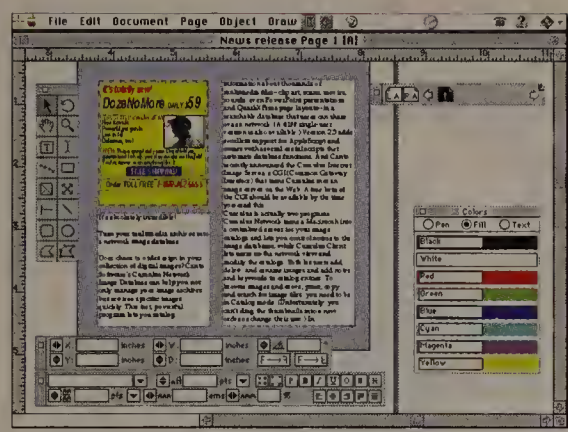
REVAMPED PAGE-LAYOUT SOFTWARE OFFERS MORE THAN THE BASICS

BEFORE QUARKXPRESS OR ADOBE PageMaker, there was Ready,Set,Go—a basic page-layout program that made its debut at the dawn of the desktop publishing era, in January 1985. Now, after languishing behind the competition for more than a decade, the program has been re-engineered and rescued from oblivion by Abbott Systems. With the release of version 7.0.2, Ready,Set,Go (RSG) has become a snappy, inexpensive page-layout program with a surprisingly rich set of features.

RSG may be inexpensive—it carries a street price of about $150—but it's not unsophisticated; in fact, it closely resembles QuarkXPress in its tool set and its approach. You lay out pages by drawing text or picture boxes and then importing files into these containers. The program uses the Claris XTND system to import a generous range of file formats.

Using the program's five simple palettes (new in version 7.0), you can easily adjust type and object specifications, including the leading, tracking, and horizontal scale of selected text. You can also flip and rotate text within a box and change the shape of the text flow itself. Runaround tools are straightforward and effective, letting you flow text around picture boxes. To simplify document creation, you can design up to 26 different master-page sets for each document and apply them to new or existing pages. When it's time to output your work, you can print registration marks, adjust the line screen, and create color separations.

You'll also find some slick features in RSG that are missing in programs costing a lot more. For example, you can drag objects such as text and picture boxes between documents. The Fonts Used and Pictures Used commands generate lists of all the fonts and graphics appearing in a document. You can save any page as an EPS graphic—and in turn import that into a text box for more-sophisticated layouts. You can create glossaries to store frequently used words and phrases or objects. Another bonus: the program employs plenty of timesaving keyboard shortcuts and includes its own simple scripting language so you can write macros to automate repetitive tasks.



Old Program, New Face Ready,Set,Go's new cleaned-up interface features five QuarkXPress-like palettes. The Typography palette, closest to the bottom of the screen, provides quick access to the program's more-sophisticated typographical features.

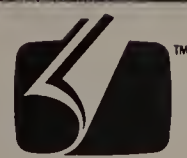
RSG does have some serious limitations. The program has its own style sheets, for example, but it doesn't import style sheets from word processors—a disappointing omission. You can create an unlimited number of custom colors, but the Colors palette itself can display only six at a time, plus black and white. The magnifying tool is also weak: it works only at seven predefined levels, and the program doesn't show you the current level of magnification in the document window. Also, if you use QuickDraw GX, you must buy a separate GX-compatible version of the program.

Finally, Abbott Systems has skimped on documentation in a big way. The 86-page users' guide is deplorable, set in minuscule type with narrow margins. It has a profoundly inadequate index and contains only one illustration—a lone screen shot. To make matters worse, there's no online help at all.

The Last Word

Ready,Set,Go obviously lacks the page-layout muscle of QuarkXPress or PageMaker, but it's ideal for home and business users who want to produce professional-quality documents without paying for full-blown page-layout software.—JOSEPH SCHORR

RATING: ★★★/6.1 **PROS:** Inexpensive; easy to use; strong word processing features. **CONS:** Doesn't import style sheets; limit of eight colors on Colors palette; awful documentation; QuickDraw GX requires separate version. **COMPANY:** Abbott Systems (914/747-3116, *http://www.abbottsys.com*). **LIST PRICE:** $395.



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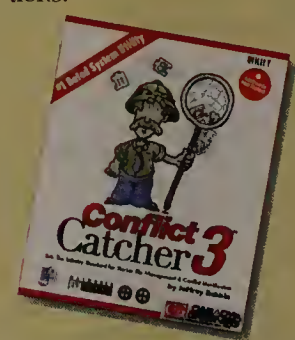

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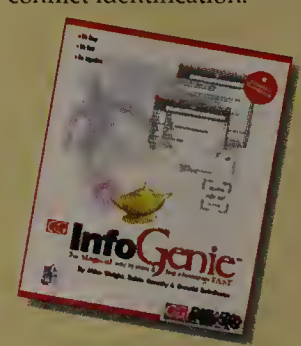

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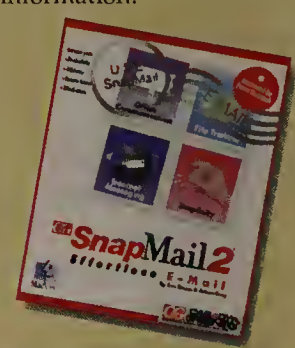

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Fujix DS-220

DIGITAL CAMERA MISSES THE MARK

THE FUJIX DS-220 IS ONE OF THE most expensive low-end digital cameras on the market, and one of the least satisfactory. Although it boasts more upgrade options than competing devices, it is significantly harder to use. Worst of all, there's no way to connect the camera directly to your Mac.

Like Apple's QuickTake 150, the DS-220 captures snapshots with a maximum resolution of 640 by 480 pixels, 25 percent fewer pixels than Kodak's DC40 and DC50. You can specify three compression levels for your images; higher-quality settings capture fewer pictures but maintain better detail.

Telescopic Observations Though blessed with many expert functions, the Fujix DS-220 is limited to two static zoom settings. If you need a different zoom level, you'll have to use your feet.

Unlike other low-end cameras, the DS-220 includes no internal memory, storing images on a PC Card. A 5MB card ($330) lets you shoot 29 pictures at the highest quality setting, compared with 34 images using an identically equipped DC50. Factoring in the difference in resolution, the DC50 stores nearly 50 percent more pixels, a difference you can see when editing and printing the pictures.

The only way to get the images from camera to computer is to remove the PC Card and stick it in a PC Card reader ($700 from Fuji), standard equipment inside many PC laptops but hardly common on the Mac side. Once you get beyond this colossal obstacle, you can open the images as JPEG files inside Adobe Photoshop or another image editor—one area in which the DS-220 (like the QuickTake) outperforms the Kodak units, which convert images using a painfully slow utility.

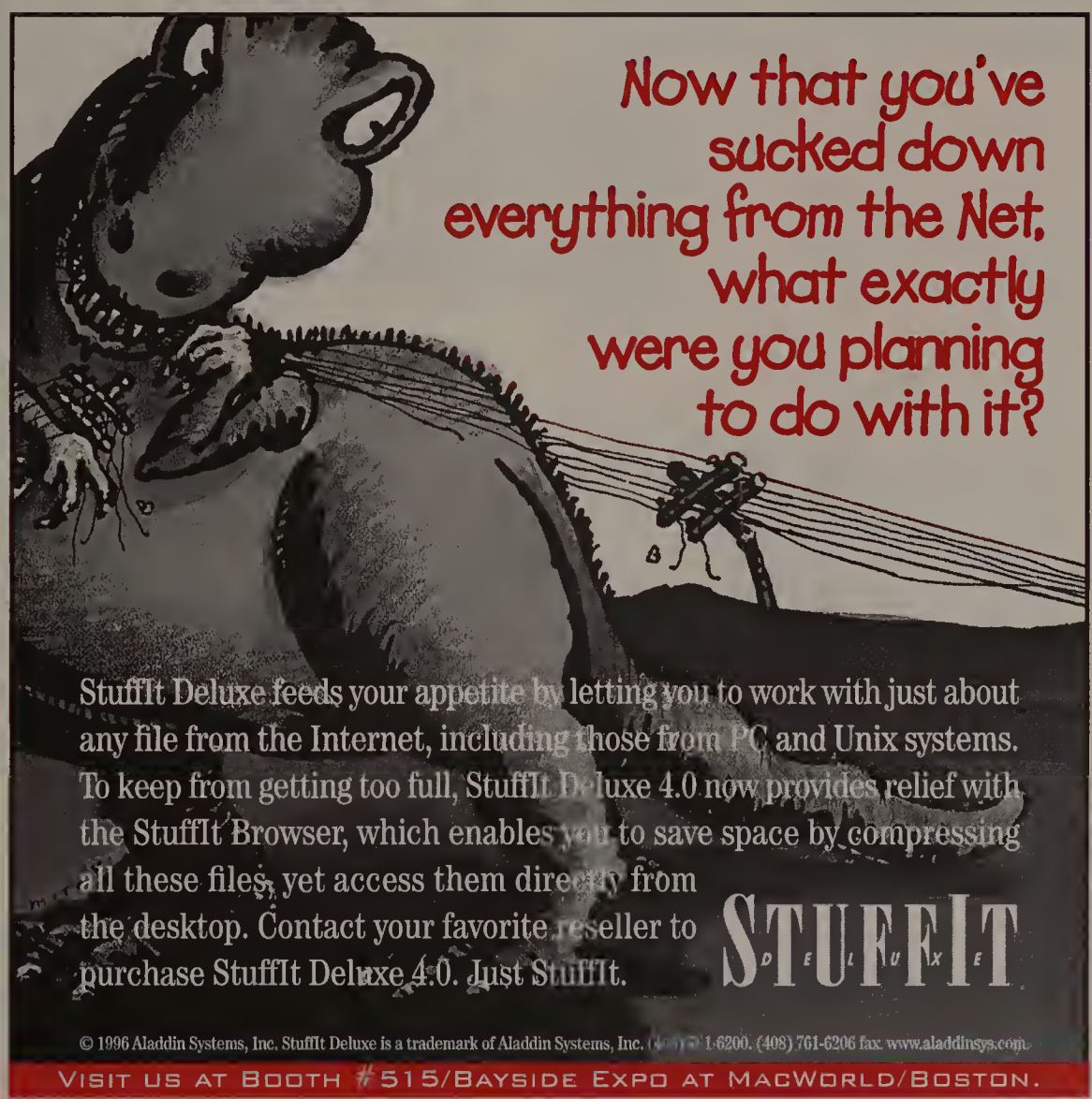
The DS-220 delivers reliable color equivalent to the DC50's. The picture detail is also good, though the camera has a tendency to generate jagged outlines along high-contrast edges. The DS-220 sports composite-video and S-Video ports so you can preview and play back pictures on an NTSC screen. Fuji sells a 2-inch camera-mounted LCD monitor ($299), but its bulkiness makes it an awkward accessory. I would have preferred to see it integrated into the housing, as with Casio's low-cost QV-10.

Fuji has packed a truckload of features into the DS-220, but the implementation is at times mystifying. You have to read the manual to figure out how to perform simple tasks, from disabling autofocus to adjusting exposure. Even turning on the camera is a two-step operation. Sometimes Fuji utterly misjudges its audience. If you aren't satisfied with the focal range—16 inches to infinity—you can purchase a $700 macro adapter that lets you focus as closely as 5 inches, a wonderful accessory for entomologists. Meanwhile, the zoom—an essential feature with nearly universal appeal—is limited to two settings (see "Telescopic Observations").

The Last Word

The DS-220's resolution and image quality are clearly insufficient for professionals, yet the camera is too complicated and unwieldy to satisfy casual shutterbugs. Though the camera offers some nice enhancements, Fuji needs to do a better job of making the features accessible to casual users.—DEKE McCLELLAND

RATING: ★★/4.6 **PROS:** Stores images in JPEG format; lots of upgrade options. **CONS:** Expensive; requires separate PC Card reader; two static zoom levels; hard to use. **COMPANY:** Fuji (914/789-8100, *http://www.fujifilm.com*). **COMPANY'S ESTIMATED PRICE:** $1200.



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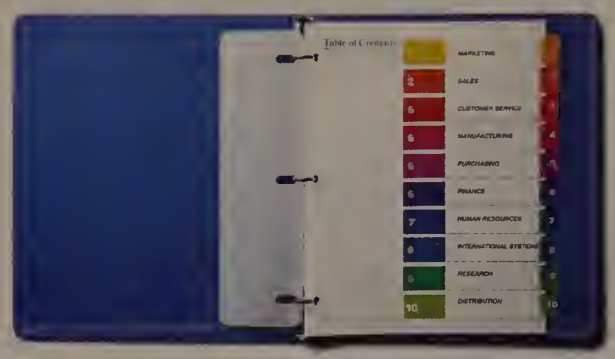

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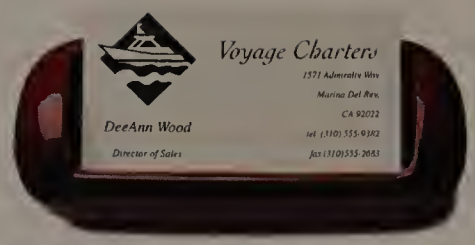

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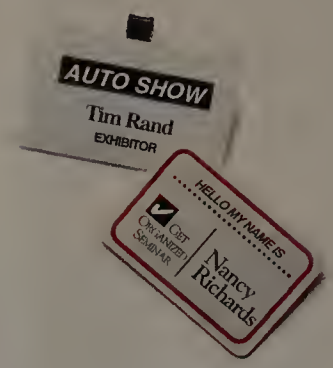

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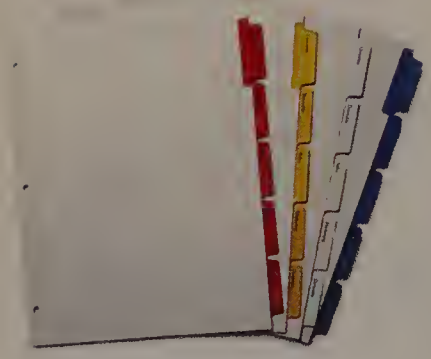

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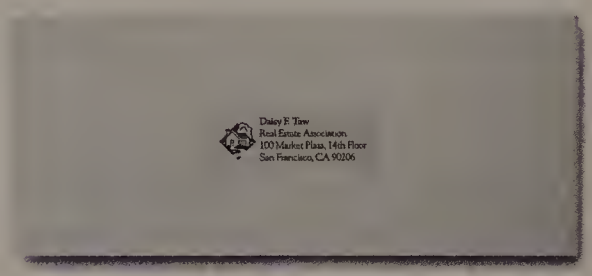

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LaserMerge Electronic Paper 2.0

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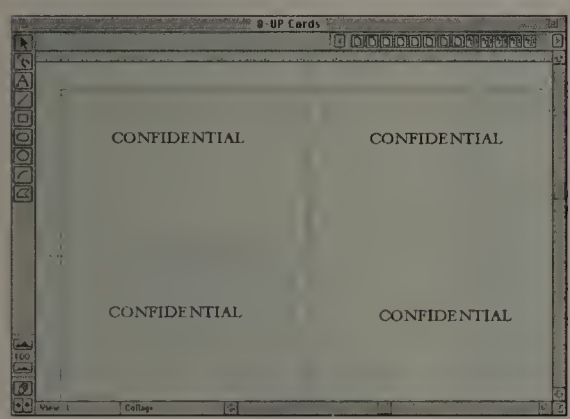
LASERMERGE ELECTRONIC PAPER, by MindGate Technologies, is a single extension that adds an imposing range of special printing features to any application. With LaserMerge, you can include items such as headers, time stamps, watermarks, and bar codes in your documents when you print them. You can also print multiple pages on a single sheet of paper to create pamphlets, brochures, business cards, and labels. The results can be pretty impressive—if you can figure out the program's complex interface and wade through the verbose documentation.

LaserMerge's capabilities go far beyond those of even the most sophisticated printer-driver software. LaserMerge lets you design new paper sizes, adjust the percentage of toner used by your printer, and store custom text and graphics to imprint on each page you output.



Paper Tricks The sometimes-confusing LaserMerge Designer lets you create custom paper sizes and add text and graphic elements. This template will produce eight identical panels on letter-size paper.

LaserMerge Designer is an application that lets you create templates defining the size of a page and including items such as watermarks, custom fields, and graphics. (The program comes with about 130 predefined templates, including 90 Avery label templates.) The Designer application has basic drawing tools, or you can import PICT and EPS graphics.

A LaserMerge button appears in the Page Layout and Print dialog boxes of your other applications. Clicking on this button lets you select a template. When you print, LaserMerge intercepts the job and combines your original document with the information in the template. You can also permanently link a document to a specific LaserMerge template.

LaserMerge lets you perform some pretty slick printing pyrotechnics. You can, for example, create a template that automatically prints multiple copies of a single document, with different headers, watermarks, or graphics on each copy. You could use this template to print three copies of an invoice—one for a customer, one for shipping, and another for accounting—and label each page. You can also output a document in a variety of formats simply by linking it to the appropriate templates. The same document can easily be printed as a two-column newsletter or a three-column brochure.

Another of the program's powerful features is its ability to prompt for information at print time and then merge this information into a document. For example, LaserMerge can ask for a person's name, fax number, and address, and then place them in a fax cover sheet.

Unfortunately, the LaserMerge interface is complicated and unintuitive—sometimes painfully so. LaserMerge Designer is powerful but hard to figure out. The numerous tool bars and dialog boxes are overly complex, and getting a template to behave exactly as you expect takes a lot of trial and error.

The program's 300-plus–page manual is wordy and filled with jargon that actually makes the program sound harder to use than it really is. By using terms like *View Domain Tier* and *Odd Continuum Page*, the manual makes some fairly basic concepts unbelievably complicated.

The Last Word

At $95, LaserMerge is reasonably priced. Though learning how to use it takes a lot of time, once you've mastered LaserMerge's tools, you'll have a tremendous amount of design control over print jobs.—JOSEPH SCHORR

RATING: ★★★/5.6 **PROS:** Adds printing features not possible with standard printer drivers; compatible with a wide range of programs; free technical support. **CONS:** Complicated, nonintuitive setup; confusing documentation. **COMPANY:** MindGate Technologies (615/937-6800, *http://www.mindgate.com*). **LIST PRICE:** $95.

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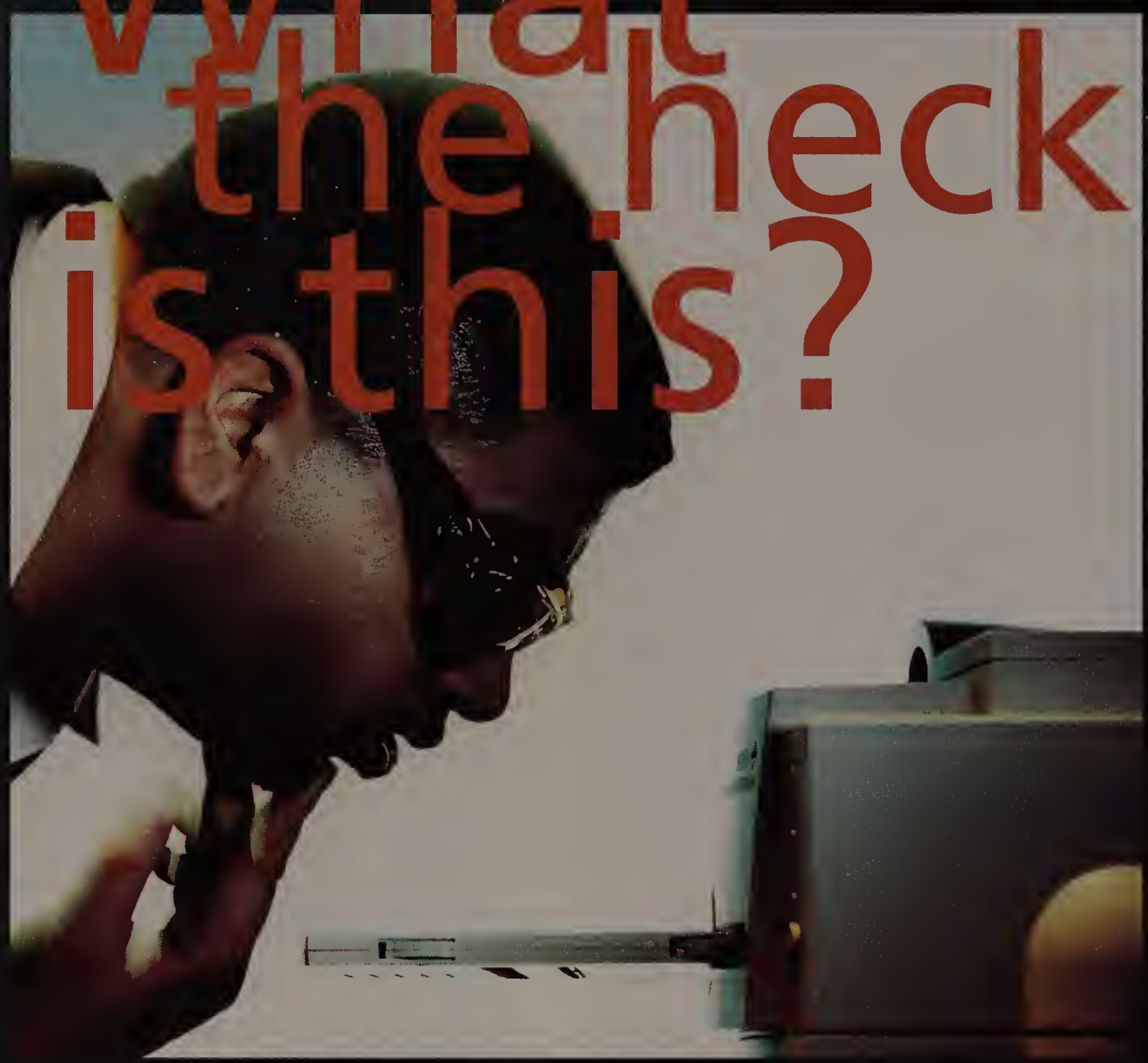

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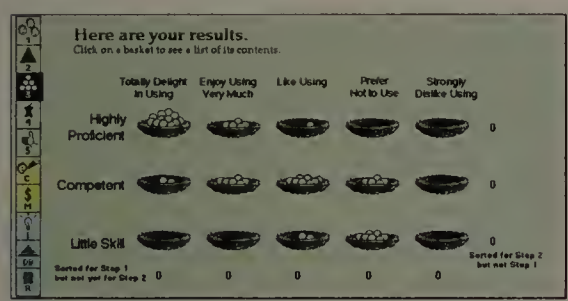
Career-Planning Software

A GOOD STARTING PLACE, BUT NO SUBSTITUTE FOR A REAL WORKSHOP

JOB HUNTING STRIKES FEAR INTO even the bravest of souls. Luckily, two programs help send you out into the market with confidence. Jumpstart Your Job Skills 1.5 identifies and prioritizes your abilities, while ResumeMaker Deluxe CD helps you present yourself in a professional manner.

Jumpstart contains the kind of analysis offered at career-counseling centers, helping you identify and prioritize job skills, learn new ones, and find jobs that make use of skills you are both good at and enjoy using. As you work your way through the exercises, you post a list of skills to your database, adding details about your experience, education, and ideas.



All Your Eggs Jumpstart Your Job Skills helps you prioritize your skills by sorting them into baskets.

Jumpstart's best module helps you sort 48 generic job skills (like evaluating, supervising, negotiating, and motivating) in order of how much you enjoy using them and how good you think you are at them. Jumpstart also contains exercises to foster a positive attitude toward job hunting, as well as ones designed to help with core skills such as reading comprehension and memory, and more advanced topics like problem solving, interpersonal skills, information management, and communication. Although helpful, the training modules aim at a low level of proficiency—the reading test, for example, feels like a high school textbook.

Jumpstart's least successful module is its résumé-builder. The idea is a strong one: building a résumé from the personal database entries you've collected in the other modules. Unfortunately, these entries aren't in proper résumé form—they're either skills descriptions or free-form ideas. You'll have the necessary raw material for creating a résumé, but you still have to export it to a word processor.

In contrast, ResumeMaker helps you create a well-designed, simple résumé quickly. After selecting one of 17 résumé formats from three basic types —chronological, functional, and performance—you enter your educational, occupational, and personal information into a series of forms. Once you enter your information, ResumeMaker creates a cleanly designed résumé, and you can experiment with formats and update items as necessary. Although you can change the position, fonts, sizes, and styling of your entries, you can't edit within each entry, by italicizing a particular word, for example.

To keep your search organized, ResumeMaker's Contact Manager tracks target companies, contact names, and phone numbers, and offers an appointment book and a calendar. It includes a basic word processor with mail-merge capabilities, and a series of Guided Letters that supply appropriate text.

ResumeMaker also offers tips and techniques for interviewing, career planning, and job hunting. I found this to be the least useful part of the program.

The Last Word

Jumpstart Your Job Skills is a good place to start, but it works better as a supplement to a career-planning workshop than as a substitute. ResumeMaker is perfect for those who need to produce simple résumés quickly, and its letter-writing, scheduling, and career-planning modules are a plus.—LIZA WEIMAN HANKS

Jumpstart Your Job Skills 1.5

RATING: ★★★/5.2 **PROS:** Easy prioritization of job skills. **CONS:** Résumé module is cumbersome; skills training is rudimentary. **COMPANY:** Up Software (415/921-4691, *http://www.upsoftware.com*). **LIST PRICE:** $139.95; multiple-user license $299.

ResumeMaker Deluxe CD

RATING: ★★★/6.9 **PROS:** Easy résumé creation; customized form letters; word processing and PIM-style features. **CONS:** Formatting options are limited. **COMPANY:** Individual Software (510/734-6767). **LIST PRICE:** $39.95.

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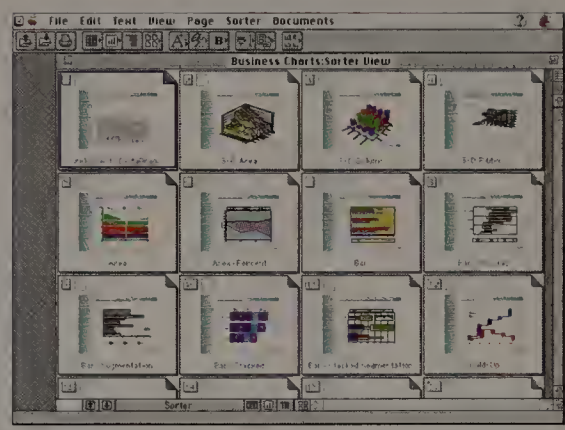
DeltaGraph 4.0

TOP MAC GRAPHING APPLICATION STILL EXCELS

DELTAPOINT HAS TAKEN THE FIVE-star DeltaGraph Pro 3.5 (see *Reviews*, January 1996) and made it better all around while avoiding the pitfall of introducing new problems. Version 4.0 retains its predecessor's biggest advantages—a simple interface and excellent libraries of stock graph types—and remains an ideal compromise between scientific and business graphing (see "Graphing for Profit").

In version 3.5, data sets larger than 20,000 points could produce odd behavior or crashes; the new version can handle a 30,000-point set with no problems other than a predictably long wait to import the data. But despite being bigger and more option-laden than 3.5, 4.0 is faster at most tasks—for example, on a Power Mac, charts pop onto the screen as soon as you select a type. Little formatting touches have been added: you can now rotate text arbitrarily, scale chart views over a giant range, and drag axes to highlight data details.

Two important additions fill in some convenience gaps. Previously, you could paste an equation onto a chart as a graphic element, but you had to create the equation using other software. Design Science's Equation Editor is now incorporated into DeltaGraph, so scientific users can show on charts the data-description formula they found using DeltaGraph's remarkably effective curve-fitting facility. The other key addition is improved integration with Microsoft Excel 5.0, including dynamic chart linking and importing blocks of cells (rather than just entire worksheets).



Graphing for Profit DeltaGraph 4.0 has a business chart library that includes every type you are ever likely to find useful.

Additions to the chart gallery are the only other important upgrade elements. Build-up charts (for displaying parts of a total), survival charts for biomedical practice, broken-axis charts, *x-y* column charts, variable-width bar charts, and floating-bar and column charts fill out the gallery; only a few seldom-seen statistical chart types and some odd financial charts that stock-market analysts use are missing.

DeltaGraph still allows you to organize slide shows and view them in outline or thumbnail mode (although you'll probably use the program to feed graphs into Microsoft PowerPoint, which would then generate the bulk of the presentation). As another plus, the handling of tick marks has been refined, and 2-D area charts can now have grids superimposed. Frankly, it's hard to see what's left for version 5.0, except perhaps to make the whole show a collection of OpenDoc parts.

The Last Word DeltaGraph is reasonably priced, it works conveniently with Excel, it's easy to use, and it has every graph type you are likely to need. It's the answer to almost every graphing question, and a key part of your Mac number-crunching software repertoire.—CHARLES SEITER

RATING: ★★★★★/9.5 **PROS:** Powerful, reliable tool set; builds Unix and Windows query tools as well. **CONS:** None. **COMPANY:** DeltaPoint (408/648-4000, *http://www.deltapoint.com*). **LIST PRICE:** $195; upgrade $49.95.

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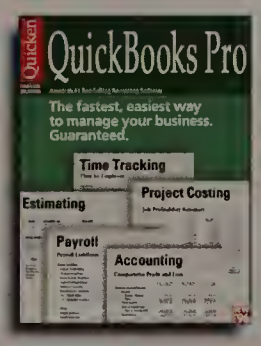

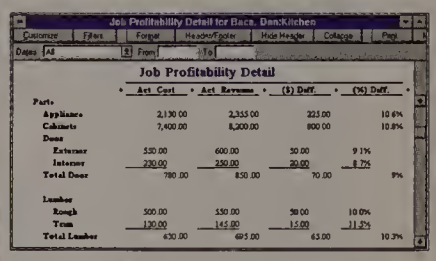

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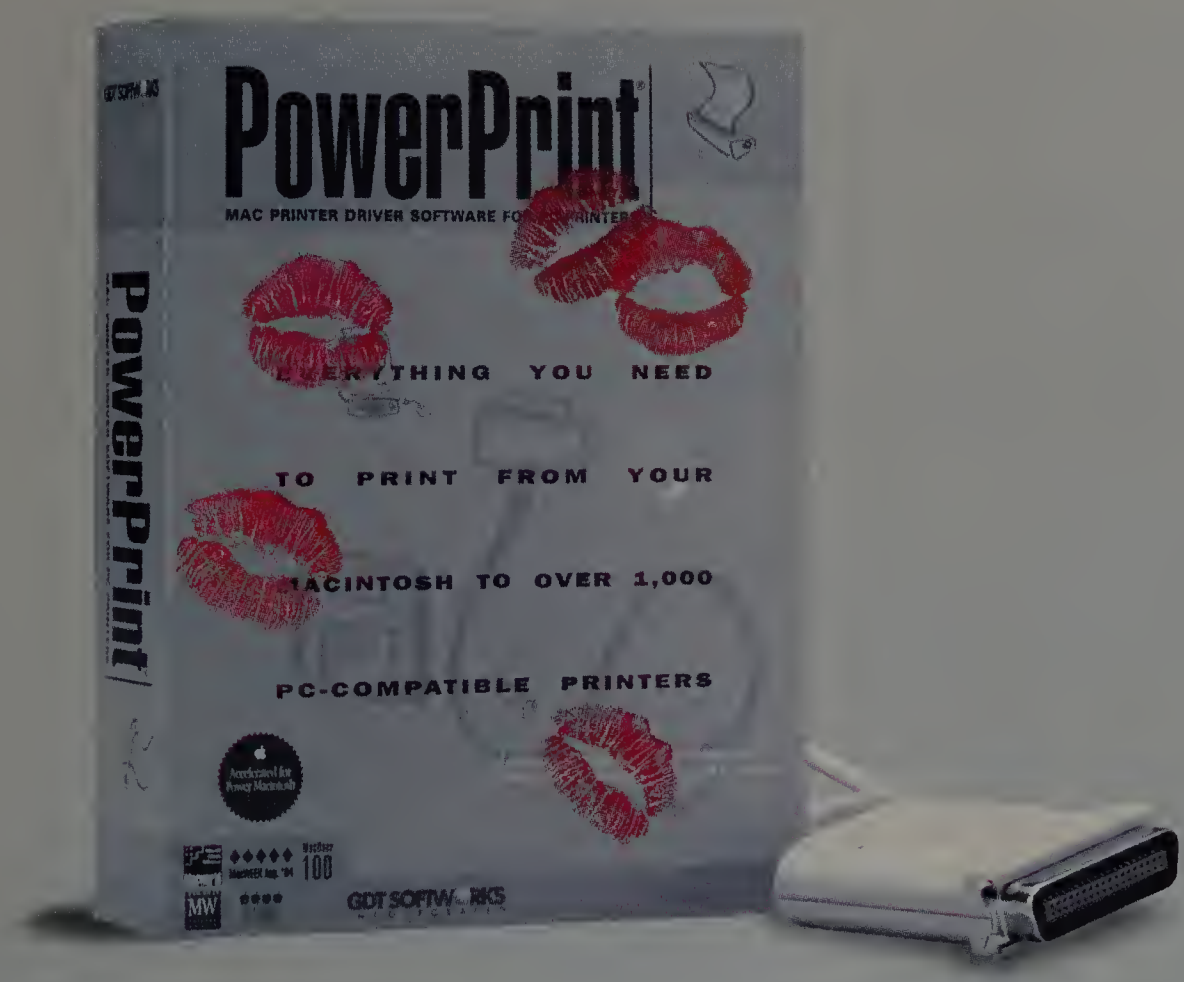

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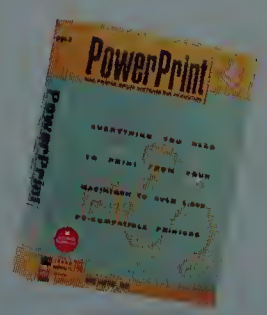

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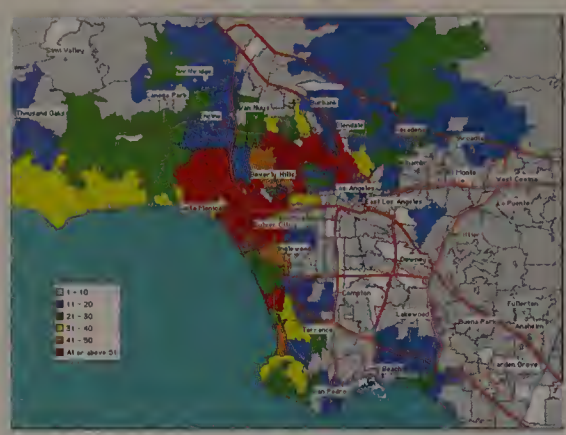
GeoQuery 5.0

PUT YOUR BUSINESS DATA ON THE MAP

MAPPING PROGRAMS RANGE from those that simply place a dot in each zip-code area in which you have a customer to the complex Geographic Information Systems used for oil exploration and planning emergency services. Somewhere in between lies GeoQuery 5.0: business mapping software that excels at creating maps of sales territories and showing data as either pushpins or shaded areas.

With GeoQuery, you can show the number of customers in each map region and control which of the map layers (such as customer data, landmarks, roads, state and county boundaries, and zip codes) are visible. You can also measure the distance between customers, create circular regions with a radius of any number of miles, and adjust the breakpoints for shaded areas. I found it easy to create useful, expressive maps from a Macintosh user group's membership database and several contact data files (see "Finding the Members").

New to the program are the options to create territories by three- or five-digit zip codes or by arbitrary boundaries, to assign areas automatically to the nearest dealer or office, and to create reports of the customer distribution in the created territories. GeoQuery uses the zip code centroid (rather than the geographic center) to locate your data; if you need more accuracy, the $395 GeoQuery Plus locates data down to the nine-digit zip level. You can access this program, which is included on the GeoQuery 5.0 CD-ROM, by paying an upgrade fee and entering a password.



Finding the Members It took only a few minutes to set up this map of Macintosh user group members, shaded by density per zip code.

GeoQuery isn't without flaws, however; the interface for showing and hiding map layers cries out for improvement, map builds can be slow, and the manual needs a better index and clearer examples.

The company also sells GeoQuery Contact ($79), a stripped-down version of the program that works with Symantec's ACT and Now Software's Now Contact and TouchBase Pro. It loads contact data from these programs via Apple events, then plots them as pushpins on a simplified map with limited detail. GeoQuery Contact is useful for those who need only rudimentary mapping ability—for example, a salesperson planning a trip that covers a fairly large territory. For serious mapping and data analysis along with contact-manager features, you need the full GeoQuery 5.0.

The Last Word GeoQuery 5.0 is great for businesses that need a geographic view of their data to create sales territories or locate a customer base; it comfortably balances flexibility and geographic accuracy with the constraints of ease of use and value. If you need maps for your business, but maps *aren't* your business, GeoQuery is an excellent choice.—TOM NEGRINO

RATING: ★★★★/7.0 **PROS:** Flexible plotting of geographic data; improved geographical accuracy over previous versions. **CONS:** Some map builds are slow; user interface and manual need improvement. **COMPANY:** GeoQuery (708/357-0535). **LIST PRICE:** $295.

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Toy Story Animated StoryBook

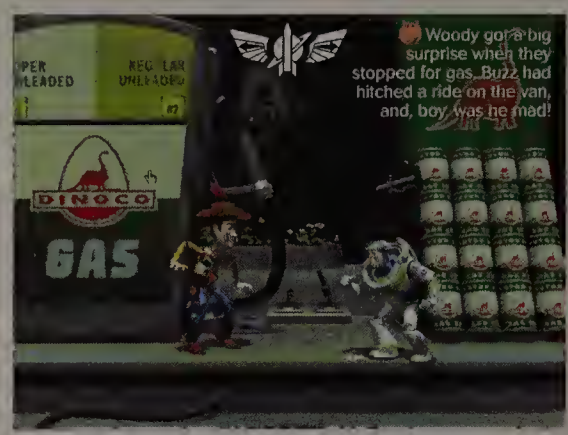
DISNEY SETS A 3-D STANDARD FOR CHILDREN'S INTERACTIVE TALES

OUR FAMILY DIDN'T EXPECT TO BE impressed by the Toy Story Animated StoryBook, the interactive version of the computer-generated movie. Sure, the story is clever, but we expect no less from the folks at Disney. And with the wizards at Pixar creating them, is it any wonder the graphics are advanced? But even in the face of such lofty expectations, Disney has done a great job, setting a high standard for interactive stories.

Geared to three- to nine-year-olds, Toy Story's format is similar to many kids' computer books. Children can have the book read to them in a linear fashion, or they can interact with the story and play its games.

The Put-Away Game is the best activity in the book. Kids put toys in their proper places by matching shadows, playing warmer-colder, or following Woody's spoken directions. Young children are familiar with these games, and spoken clues—read by the movie's stars—are reasonably precise. Incidental sounds throughout the story are outstanding, just like in the movie.

Many of the interactive segments take ideas from the movie and make them even better. As players stretch Slinky Dog out and watch him snap back, the 3-D perspective is fantastic. Likewise, kids can redecorate Andy's room and watch as it morphs from a Woody theme to a Buzz theme while Woody complains.



Showdown When you click on hot spots, Buzz and Woody take their best shots at each other.

In the Escape Plan, each toy imagines it's part of a scheme to break out into the world. Scenes appear in the characters' "thought bubbles," and kids can try out various challenging scenarios. During the Maze Game, kids operate Woody and Buzz by remote control, avoiding Sid's dog, Scud, and trying to catch the moving van. It's standard game fare, but it's fun.

Not all of the modules are right on target, though. Visual clues are a little difficult to follow in Woody's Scheme, where Woody asks kids to help develop a Rube Goldberg–esque sequence to eliminate Buzz from his life. The Crane Game—based on the arcade machine where you manipulate a claw to grab a toy—incorporates color matching and counting. It's fun for younger players, but it's a good thing each level changes after a few rounds.

The Last Word Not surprisingly, Toy Story Animated StoryBook's biggest appeal is its connection to the movie. The 3-D imaging is superb for a children's edutainment package. Our kids enjoyed all the interactive segments, and we were pleased to find the games challenged our youngsters' developing thought processes while they entertained.—DAVE AND ROBIN MINNICK

RATING: ★★★★/7.7 **PROS:** Animation comparable to the movie; most games clever and appropriate for age group. **CONS:** Some activities miss the mark. **COMPANY:** Disney Interactive (800/900-9234, *http://www.toystorybook.com*). **COMPANY'S ESTIMATED PRICE:** $35.

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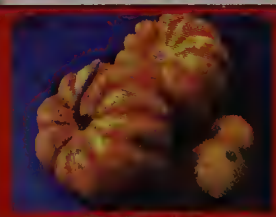
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Viewable Image Size	20"	20"	18.7"	15.9"	15.7"
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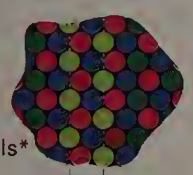
0.21 mm mask
1818 displayable pixels*



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Bad Mojo

WANT TO BE A FLY ON THE WALL?

THE ULTIMATE SYMPTOM OF POPULAR culture's love affair with grime, or clever plot device? In Bad Mojo, you become a cockroach seeking nothing less than the redemption of your humanity, both corporeal and spiritual. Bad Mojo revels in graphics, video, sound, and gritty style, but never at the expense of its plot.

Upon being demoted from two legs to six, your first thoughts might focus on how to resume your human form. But such lofty goals will have to wait, as you're faced with more pressing problems. You're a bug, and it's a big, nasty world out there. Your on-screen representation is creepily lifelike, equipped with scuttling legs and waving antennae. You maneuver using simple keyboard controls that quickly become second nature. Although you occasionally navigate tight passages, your form is most important as a metaphor. Your persona is merely a way to explore your environment, and your diminutive size is an invitation to look closely and pay attention to what you see.

Indeed, the cast-off minutiae of everyday life are suddenly of immediate concern to you in your new body. Navigating a seemingly small room is an epic journey as a rivulet of water is transformed into an impassable stream and a paint spill becomes a sticky death trap.

Kafka-esque You haven't lived until you've crawled across a counter full of rotting meat.

Puzzles and obstacles in Bad Mojo are based on manipulating or avoiding the components of your environment—for instance, fending off a predatory spider by using a burning cigarette butt. Insects, rodents, and a mysterious guardian angel give you hints by way of surreal dream sequences. This advice, while cryptic, is invaluable, as your next step frequently is not clear.

Beyond the immediate difficulties of getting around safely, you attempt to discover who you are, who shares your world, and why you have become a cockroach. An introductory cinematic trailer sets the scene and the cast of characters—you, your seedy landlord, and his cat—but provides few details. As you scurry across photographs, memorabilia, and other objects, they spring to life as movies that illustrate the events leading up to your metamorphosis. These sequences draw you into the story, revealing the touching layer of humanity beneath the game's sordid surface.

The world of Bad Mojo is made up of lush, colorful, and disturbingly sharp photographic images, with the occasional 3-D modeled scene. It's easy to believe that you're a cockroach crawling across a plate of food or on the underside of a table, dodging wads of gum. Bad Mojo is ugly, slimy, sticky, greasy, and absolutely gorgeous.

The Last Word Bad Mojo often veers into the melodramatic (and occasionally into the downright goofy), but as a whole it has enough style to run the generators of Hip City for a month, and never loses sight of the tale at hand. Bad Mojo is a multimedia game done right.—CAMERON CROTTY

RATING: ★★★★/8.8 **PROS:** Lush graphics; gorgeous atmosphere; innovative premise; compelling story. **CONS:** Some hammy acting. **COMPANY:** Pulse Entertainment (310/264-5579, *http://www.badmojo.com*). **LIST PRICE:** $54.95.

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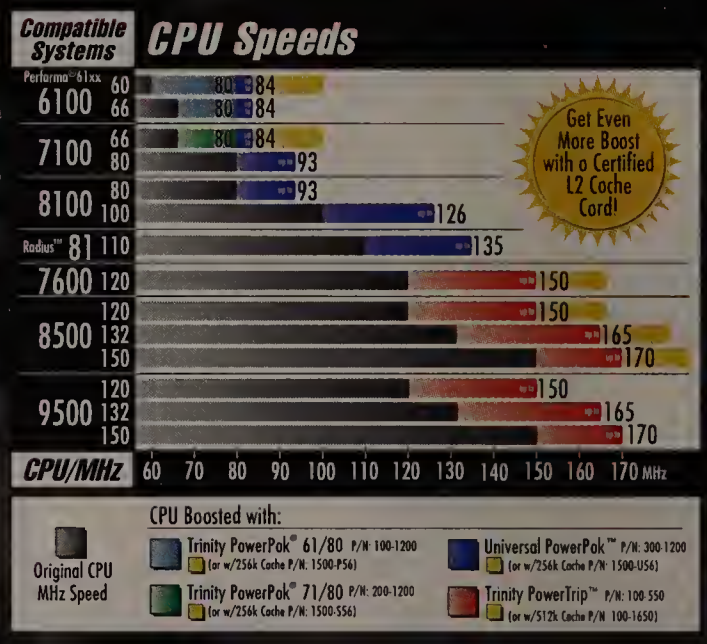

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Alps Adjustable Mouse

MOVABLE SHELL TILTS FOR OPTIMUM ANGLE

HANDS COME IN ALL SHAPES AND sizes, so finding a mouse that's right for you isn't an easy task. Even if you're lucky enough to find the perfect mouse, chances are it won't be ideal for everyone who shares your computer. Enter the Alps Adjustable Mouse, the first pointing device I've seen that lets you adjust its height to match the position of your hand and wrist.

The key to the Adjustable Mouse's flexibility is a movable plastic shell that's permanently attached to the mouse's top. To adjust the height, you press a button at the front of the shell to unlock it. You raise the shell by sliding it back, and lower it by sliding it forward. When you release the button, the shell clicks into position.

The adjustable shell lets you keep your hand and wrist in a straight line, a position that minimizes stress on the wrist. Unfortunately, the Adjustable Mouse does have a few drawbacks. For instance, even with the shell at its lowest setting, the Adjustable Mouse has a much taller profile than Apple's mouse, so it may be too big for people with small hands. And since the shell doesn't completely surround the front and sides of the mouse, your thumb and fingers rub against the edges, which some people may find irritating.

ROBERT PERRY

On the plus side, the Adjustable Mouse sports three buttons that provide just the right combination of audible and tactile feedback. The mouse also comes with control-panel software that lets you adjust pointer sensitivity and acceleration and program the buttons. You can specify any one of nine actions (including single-, double-, and triple-click, click lock, escape, and simple keyboard equivalents) for each button. You can also assign sequences of up to 20 characters or function keys to any two- or three-button combination—for example, you can program the mouse to type your name when you press the two left buttons at the same time. The user's guide, which covers both the Macintosh and PC versions of the mouse, does a good job of explaining how to use the software, and a brief pamphlet on setting up your workspace is a worthwhile addition.

The Last Word The Alps mouse addresses only one of several ergonomic variables that determine whether a mouse is a joy or a pain to use. Although some people may find the adjustable height helpful, it didn't make much of a difference for me. (Being able to change the mouse's width would be more beneficial, but it probably couldn't be done at a reasonable cost.) Even if you never use the height adjustment, though, the Alps mouse is a good value for the money.—FRANKLIN TESSLER, M.D.

RATING: ★★★/6.4 **PROS:** Movable shell adjusts to different hand positions; programmable buttons. **CONS:** Tall profile may not fit small hands. **COMPANY:** Alps Electric (408/432-6000, *http://www.alpsusa.com*). **LIST PRICE:** $39.95.

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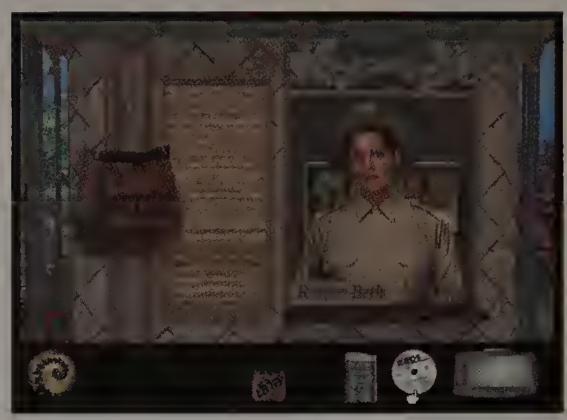
Chaos

HIGH-CONCEPT CD-ROM GAME IS LOW ON ENTERTAINMENT

AT THE TIME IT MUST HAVE seemed like a great idea: Put the creative geniuses from New York University's Interactive Telecommunications Program and HarperCollins Interactive in a room. Ask them to design a fantasy adventure game like Myst, only better. Base the game on very trendy, very visual chaos theory. Call it, um, Chaos. How could it go wrong? Easily, it would seem.

To be fair, Chaos's graphics are very classy. Not as atmospheric as Myst's—perhaps because many images are fabricated fractally, and fractals tend to be a bit hard-edged—but classy nonetheless. Its QuickTime-based characters are pretty impressive, too (see "Keep Off the Grass"). Where the game falls flat is in the playing.

Chaos fits the classic adventure-game mold: initially ignorant and empty-handed, you wander a virtual landscape finding helpful tools, unearthing useful information, and solving puzzles. Unfortunately, many of Chaos's puzzles seem inspired less by chaos theory than by money—both getting it and spending it. That may be Ivan Boesky's idea of an adventure game, but it's not mine.



Keep Off the Grass Chaos's ten characters—including this park ranger/dancin' fool—don't just talk (sometimes excessively), they also move around realistically within the scenes.

Furthermore, in a game supposedly based on chaos theory, Chaos's unrelenting linearity is disappointing. There's only one way to start, one way to play, and one (rather anticlimactic) ending; you have to solve each puzzle completely before going on to the next one. In defiance of chaos theory's most famous axiom, small changes in how you start or play Chaos don't lead to large—or any—changes in the outcome.

Also unfortunate is that simply discovering a puzzle's solution is often insufficient. In one particularly exasperating example, once you've unearthed the puzzle's secret, you must repeat the same sequence of steps 15 times. Such mindless repetition gets stale very quickly. So does pointing and clicking, the sole means of communication: you point at where you want to go, point at objects you want to pick up, jab characters in the chest to make them talk. The pointer does change to a directional arrow or hand, but it's often so slow to change that it can be highly misleading. And that pokiness is only part of the overall speed problem. On my usually nimble Power Mac 7500 and quad-speed CD-ROM drive, Chaos could be agonizingly slow. It also had some irritating glitches, crashed once during play, and corrupted my saved game twice.

The Last Word Although Chaos does have a sense of humor and imparts some basic information about chaos theory, for my money I'd rather play the more entertaining Myst and read James Gleick's more informative book, *Chaos: Making a New Science*.—ROBERT C. ECKHARDT

RATING: ★★/3.8 **PROS:** Nice visuals; mildly educational. **CONS:** Slow; buggy; puzzles are surprisingly uninspired and often tedious. **COMPANY:** HarperCollins Interactive (212/207-7000, *http://www.harpercollins.com/hci/*). **LIST PRICE:** $49.95

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—Peter Scisco, Computer Life, May '96 issue (page 108)

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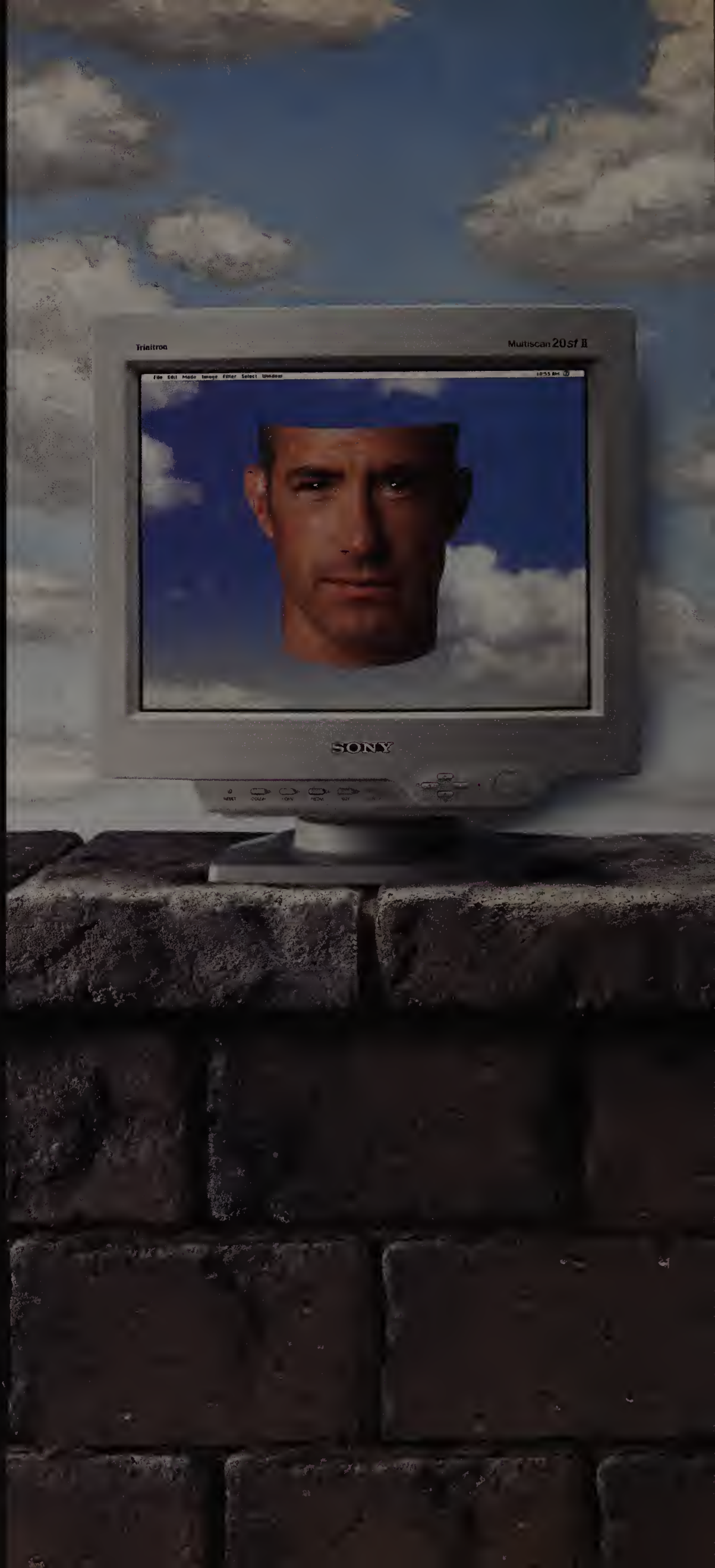

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NEW MAC MAGIC CAN BE JUST AROUND THE CORNER. THE TIME IS RIGHT FOR APPLE TO REINVIGORATE NOT ONLY THE MACINTOSH BUT THE ENTIRE PERSONAL COMPUTER INDUSTRY, WITH BOLD DESIGN, CUTTING-EDGE TECHNOLOGY, AND UNPARALLELED EASE OF USE.

MACWORLD PRESENTS
The Mac Reborn

Innovation has always been the Mac's hallmark, but in the last few years Apple's emphasis on toeing industry standards has made some products too staid. Now is the time to reignite our hopes and reveal once again all that a Mac should be.

Macworld has created blueprints for two totally new Macs—one desktop named Enterprise and one notebook named Galileo—to help Apple again take the lead in the computer industry. These innovative systems—which Apple could develop in time for release at the August 1997 Macworld Expo, if it chose to—resurrect the wonder and excitement of the past's best Macs, providing a model platform for the next decade. With these designs, the Mac is reborn.

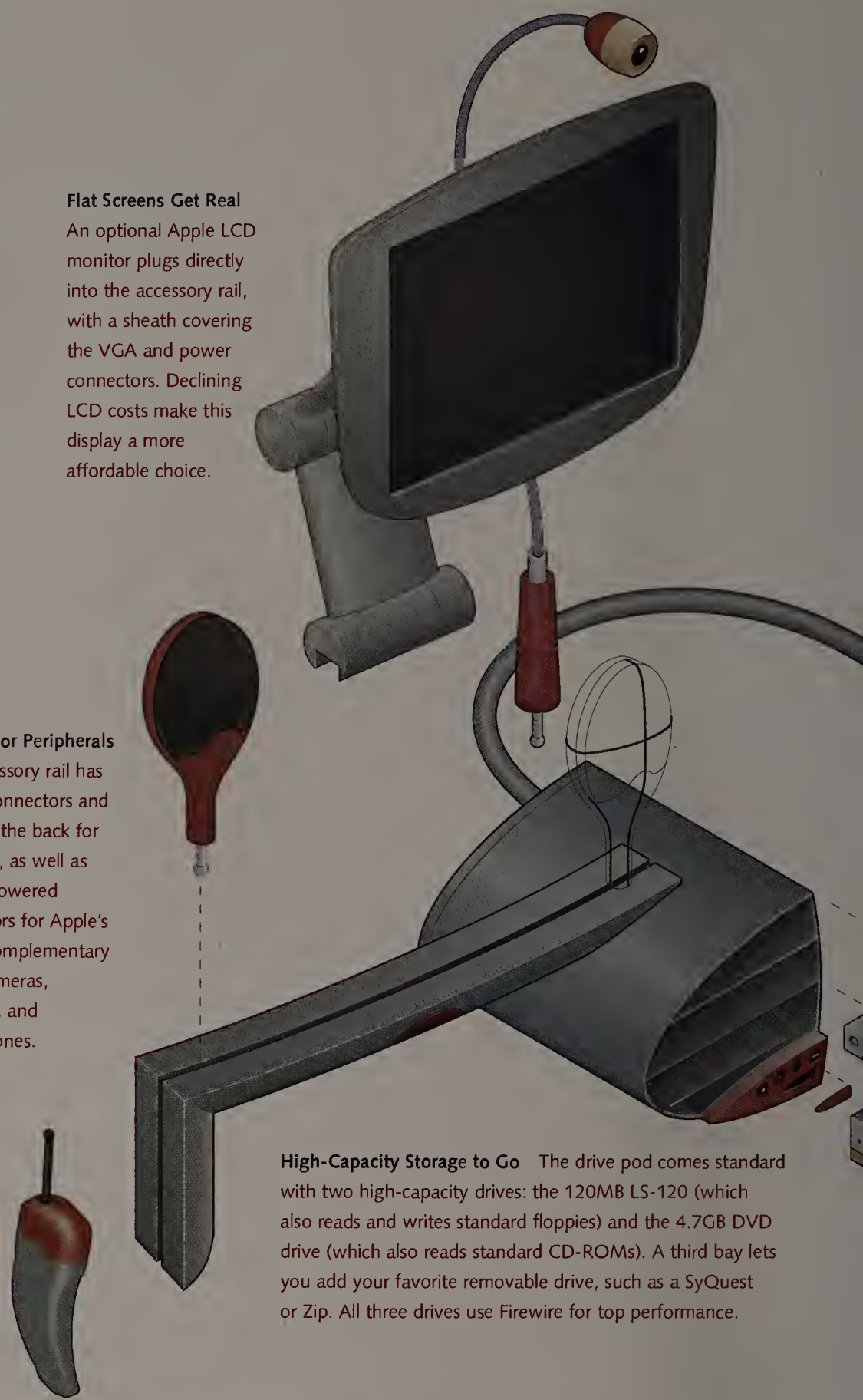
Inside, these Macs take advantage of the best technologies now or soon to be available that we believe are practical yet a significant step forward. On the outside, they combine a head-turning, assumption-challenging look created by Frogdesign, the internationally acclaimed product-design firm that created the original Mac's design, with a strong focus on ease of use.

Despite their leading-edge technology and spirited design, these model systems are no pie-in-the-sky contraptions. Fully equipped, these systems would cost no more than today's flagship Macs, comparable to the Power Mac 7600 and 8500 ($3500 to $4000) and to the PowerBook 5300ce ($4500 to $5000). And they could cost less.

As exciting and innovative as *Macworld*'s model systems are, we harbor a hope that Apple will outdo even our ambitions in its next-generation Macs. But whether or not Apple does, there's now a benchmark against which both Apple and the Mac-clone industry can measure their leaps forward—and something for all Mac aficionados to lust after. Prepare to lust.

A Better Design

Beyond its head-turning look, our proposed Power Mac introduces a challenging new approach to computer design. We break the pattern of bigger and bigger boxes on your desk and separate the Mac into the three essential clusters: the drive pod, which contains the peripherals you use every day; the accessory rail, which is the home for your audio and video accessories; and the control tower, which contains the motherboard, PCI cards, and internal drives you don't need in front of you.



Flat Screens Get Real An optional Apple LCD monitor plugs directly into the accessory rail, with a sheath covering the VGA and power connectors. Declining LCD costs make this display a more affordable choice.

A Place for Peripherals The accessory rail has power connectors and ports on the back for monitors, as well as special powered connectors for Apple's line of complementary video cameras, speakers, and microphones.

High-Capacity Storage to Go The drive pod comes standard with two high-capacity drives: the 120MB LS-120 (which also reads and writes standard floppies) and the 4.7GB DVD drive (which also reads standard CD-ROMs). A third bay lets you add your favorite removable drive, such as a SyQuest or Zip. All three drives use Firewire for top performance.

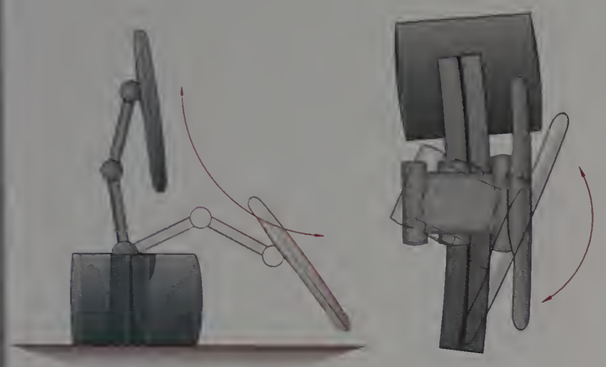
Wireless Connections A combination infrared and radio port allows remote connections to IR-equipped computers and printers, as well as to radio-controlled input devices.

PHOTOGRAPHY BY RICK ENGLISH

The Drive Pod

Why have the entire Mac on your desk? Our new design places just the components you use every day, leaving your desk more open. Strategic use of front-panel connectors and wireless ports keeps clutter down even more.

An umbilical cord containing the necessary power and bus connections runs from the back of the drive pod to the control tower, which you can place under your desk, to the side, or in a closet.



Any View You Want The optional LCD monitor comes with a tilt-and-swivel base so you can position it at the best possible viewing angle—and even turn the panel to face someone looking over your shoulder or sitting beside you.

The Accessory Rail

We all have a set of peripherals we place around us to enrich the experience of using the Mac. The accessory rail, a powered extension bar that plugs into the drive pod, provides the power and the ports for such devices: speakers, phone, microphone, video camera, and monitor.

The monitor uses standard power and VGA connectors, but the other components plug into the rail's track. You'd use the drive pod's and the control tower's connectors for standard peripherals.

CRT Standard The desktop system supports traditional monitors as well as LCD panels, with an included stand that fits over the accessory rail. The monitor plugs into a VGA connector and power connector at the back of the accessory rail.

The Control Tower

The heart of the Mac, as well as its brains, reside in a tower case that you can keep out of the way—or use with the drive pod in a traditional setup.

The tower's design focuses on top performance and upgradability. The use of industry-standard parts keeps costs down while letting us exploit high performance. The technologies used are leading-edge but not esoteric. And as technologies improve, you can update components individually or eventually replace the entire motherboard.

Fast CPUs at the Ready The standard desktop system comes with one PowerPC 604e CPU, running at 264MHz. Dual-CPU cards are available, so you could expand to a two-CPU or four-CPU system. The CPU card automatically sets the motherboard's system-bus speed for optimal performance. A cache slot is included in case you don't use SDRAM on the motherboard.

World-Class Communicator A PCI communications card includes a 33.6-Kbps fax modem and telephony features (voice mail, Caller ID, and so forth). A card that adds an ISDN or ADSL modem is optional.

The Multimedia Advantage To ensure that Apple's pioneering media technologies are adopted, we added on-board acceleration for QuickDraw 3D and MPEG playback. High-speed video circuitry is also included.

High-Power Innards Unlike previous Macs, ours capitalizes on industry-standard components and technologies—made possible by Apple's adoption of the Common Hardware Reference Platform—to save costs and take advantage of the rapid rate of performance increase in the PC industry. Those components include:

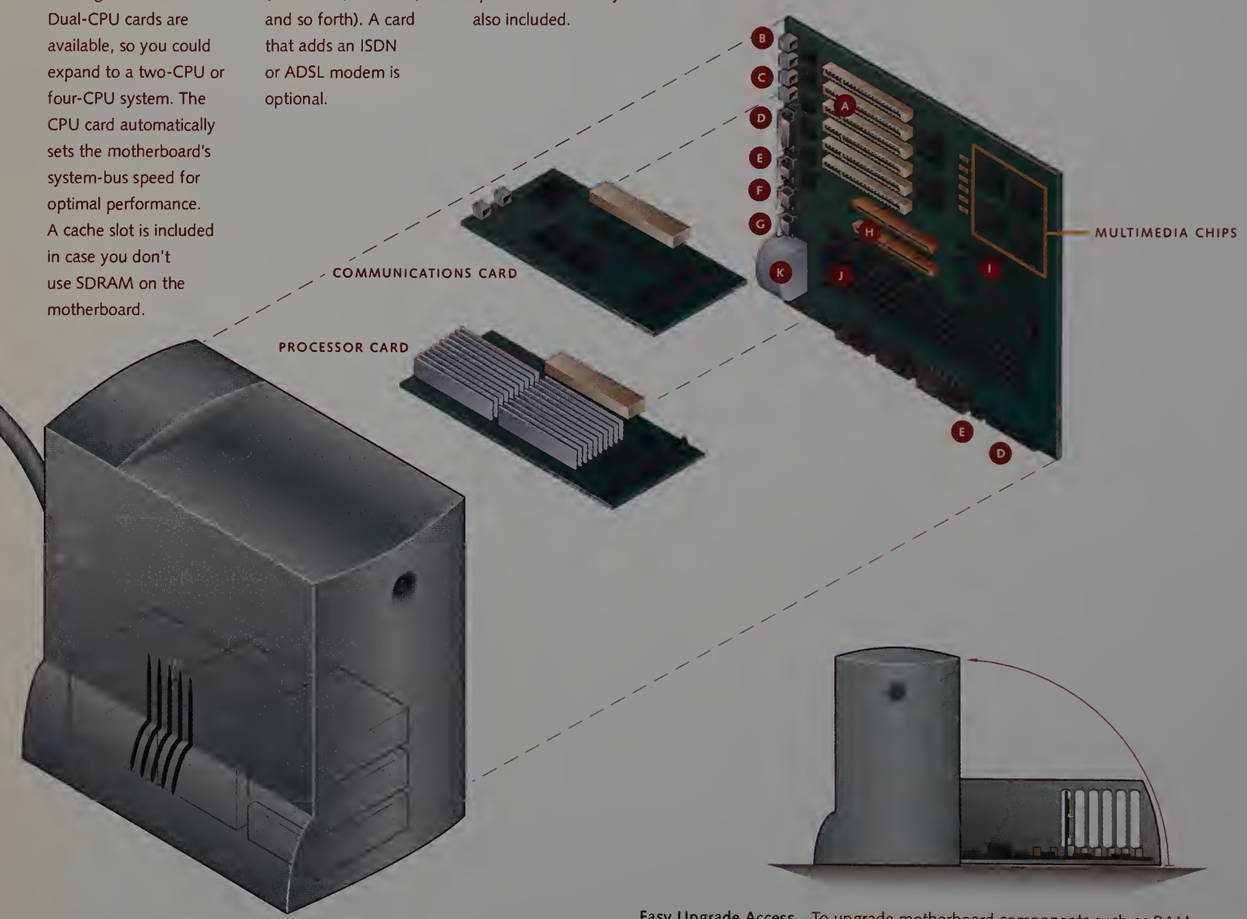
- **A** Six 64-bit PCI slots
- **B** Two Universal Serial Bus ports (they replace GeoPort)
- **C** RCA audio-input and -output ports
- **D** SCSI-2 ports
- **E** Firewire ports
- **F** Autoswitching 10BaseT/100BaseT Ethernet port with RJ45 connector
- **G** VGA video port
- **H** CPU card slots with automatic bus timing
- **I** VRAM slots
- **J** Eight DIMM slots that support either synchronous dynamic RAM (SDRAM) or asynchronous (standard) RAM
- **K** Umbilical-cord connector

Lifeblood Connection The drive pod won't function on its own—it needs power and the data for its components. That's where the umbilical comes in—it brings all the power and extends all the required buses from the control tower to the drive pod.

Common Ports Up Front The front panel offers the standard ports for common peripherals, including Firewire, Universal Serial Bus, and RCA audio. You can add a SCSI-2 or ADB port with an optional card in the mini PCI slot.

Traditional Tower If you prefer a more traditional tower setup, or need to work with a 19-inch or larger monitor, you can dock the drive pod into the control tower and use the video connector on the motherboard rather than the connector on the accessory rail.

The drive pod's drives all have clamping spindles for the disks, like those in a portable CD player, so the drives work fine in either horizontal or vertical orientation.



Easy Upgrade Access To upgrade motherboard components such as RAM and PCI cards, all you do is release the control tower's side panel, which folds down, putting everything down on a flat surface for easy access.

The New Power Mac

EVEN AS THE MAC EVOLVED FROM a unique system to a PC-like box, one thing remained true: Apple's focus on how users work with computers. Call it ease of use, call it ergonomics, call it the Macintosh spirit—it's fundamental to the Mac identity no matter what CPU, bus, or drives Apple may use. In designing the next-generation Mac desktop system, we kept that principle central.

How People Should Interact

Our new desktop, code-named Enterprise, has a radical new approach to case design: the components you work with every day are on your desktop in the drive pod, while the engine is in a separate case, called the control tower, that you can store under your desk, leave in a closet, or put to the side.

Dealing with Data The swoopy curved pod that anchors the Mac to the desktop holds your removable media. Two drives come with our new Macs. One is an LS-120 floppy drive, which handles a new 120MB disk developed by Matsushita and 3M, as well as today's standard 1.4MB floppies.

The other is a DVD (Digital Versatile Disc) drive, a new type of CD-ROM drive whose discs hold seven times the information a standard CD-ROM holds and run faster than an 8× CD-ROM drive. And a DVD drive can read today's CDs.

There's a third bay in our drive pod, so you can add a removable drive specific to your work: a SyQuest, Zip, recordable CD-ROM, magneto-optical, or tape.

Interaction Panoply At a time when the Internet and digital media are exploding, a desktop computer is defined as much by its links with other data sources as by how it processes the data. The *Macworld* vision for the Power Mac supports a variety of common ports for devices you interact with: serial (for pointer and keyboard), audio input and output (for speakers or headphones, and microphones), video (for monitors), infrared (for wireless communication with notebooks and some printers), radio (for wireless mice and keyboards), and Firewire (the upcoming high-speed SCSI standard, for storage devices, digital cameras, scanners, and even other computers). We use Intel's Universal Serial Bus instead of Apple's GeoPort serial port, and RCA audio jacks instead of miniplugs, to give the best performance for such devices. But one miniplug remains for typical headsets and headphones.

We also include an empty 32-bit PCI slot that holds a small card for a special-purpose port. Such a port might come with a particular product—perhaps for digital video editing—or could be used to add ADB or standard SCSI-2, at the desktop, for people who don't want to give up their old peripherals.

And a bundled remote-control device operates the DVD drive and a TV-tuner card (if you add one to the control tower).

Note the use of adjustable, ergonomic input devices: there's no reason to shave a few dollars off the cost and put people's health at risk. Such devices are now affordable, and should be standard. People with special input needs can replace or add devices as they do now, using the built-in Universal Serial Bus or the optional ADB.

Surrounding Experience The architectural bridge that extends from the drive pod, called the accessory rail, not only stabilizes the desktop system but also extends its reach. Through it you connect other peripherals: phone, microphone, speakers, video camera, and monitor. This raises these common peripherals off your work surface, leaving it free for papers, books, and other materials. Of course, you don't have to use this accessory rail—the drive pod can sit by itself or on top of the control tower.

The monitor could be a standard CRT monitor or an LCD monitor. Whichever display you prefer, the desktop system uses a standard VGA connector, so you can buy displays from any monitor maker. Our Mac comes with a Mac-to-VGA adapter so you can still use your current Mac monitor.

In support of these accessory rail add-ons, a bay in the control tower lets you add a shielded subwoofer, for truly wall-thumping audio when combined with quality external speakers.

AV Alley These views from the back highlight the *Macworld* Mac's accessory rail, which lets you add a full set of audiovisual appliances yet keep your work surface free. Ports on the front let you add standard peripherals.

Also in the control tower, MIDI synthesis is built into the motherboard circuitry.

Communications Built In We fully expect to see computers and phones merge, even if you still have a separate phone somewhere else in the office. The real issue is not where the phone handset is but where the communication is managed. It makes more sense for your Mac, with which you manage your textual and graphical communication, to be that center.

A directional microphone is standard equipment, so you can use your Mac's modem to place voice calls. (A traditional wireless phone or headset can be used as well, so you can listen

in private.) We also expect Apple to include voice-message-handling capabilities in Mac OS 8, the new operating system (previously code-named Copland).

All systems come with a PCI card for personal communications, sporting a 33.6-Kbps fax modem (this new standard was approved in late June) and phone-management and voice-mail features. Dealers could substitute a card that also offers high-speed ISDN or the newer asymmetric data subscriber line (ASDL) connections for heavy Internet users.

Always On Because the Mac could also be a phone, which you don't turn off, we do away with the Finder's Shut Down menu item—the Mac puts itself to sleep after a user-specified time, so it's always ready to wake up to handle calls without wasting energy. If the system crashes, it turns itself back on automatically and restarts.

There's still a power key on the control tower in case you truly want to turn the system off; activating the power key on a running system engages the standard Mac shut-down process.

Behind the Scenes The control tower holds the motherboard, two CPU slots (one used by the CPU card), six PCI slots (one used by the communications card), up to three internal drives, network and communications ports, and the power supply. An umbilical cord from the tower to the drive pod provides all power, video, audio, Firewire, and PCI-bus connections.

Reduced Clutter Notice the extensive use of wireless connectors. Why have a ton of cables on your desk if you don't need to? No reason we can think of. The accessory rail also helps eliminate clutter, as does separating the engine from the devices you use every day. In fact, you could have as few as one cable on your desk—the umbilical that connects the tower to the drive pod.

High Performance at a Good Price

Computers only go faster, and for years Apple has struggled to keep the Mac competitive with PCs. It's scary to realize that Intel expects the entry-level PC to have a 133MHz Pentium by the time you read this, and Intel has a whole CONTINUES ON P. 115

A REAL WEB STRATEGY | Bong! Welcome to the Internet

More than a decade after the Macintosh first rode into battle against the forces of the command-line interface, another technology with the power to change our lives—the Internet—is being similarly obscured by the technical elite that seems to take puritanical delight in forcing everyone to learn complicated, arcane incantations.

While Apple has offered a broad Internet strategy anchored in content creation, distribution (serving), and browsing, the company should focus its efforts on driving the Internet deep into the heart of the Macintosh experience. With the hardware in place (fax modem, Ethernet, and plenty of RAM), Apple's Internet strategy becomes a question of software and service. The Internet should be ubiquitous, pervasive, and convenient.

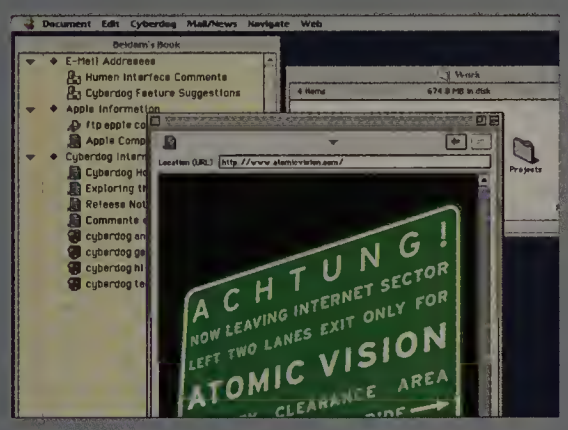
For Every Mac, a Connection Every Macintosh purchased should be connected to the Internet. From a physical standpoint, if you're not on a LAN, plugging the telephone cord into your new Mac should be as automatic as plugging in the power cord. To complete the loop on the service end, Apple should make a deal with one or more of the telecommunications giants (AT&T, MCI, or Sprint) to provide free (and preferably unlimited) Internet access for six months, with server space for a personal Web page.

For Every Connection, a Use Internet services should be woven so tightly into the fabric of the Mac OS that the line between local and distant resources is blurred almost to nonexistence. On the client side, this means that Internet services should appear as part of the basic OS. For example, the Find command should include an option to search the Internet with a metasearch tool, a utility that queries multiple search engines and then assembles and ranks the results. Apple should also revive the PowerTalk-style unified in-box for E-mail, voice mail, and the like, but build it out of OpenDoc parts.

On the server side, Apple should concentrate on what it does best: peer-to-peer, personal networking. During his speech at the Worldwide Developers Conference in May, Apple Internet czar Larry Tesler said that every Mac sold should be able to act as a Web server, and publishing your Web page should be as simple as dragging the appropriate files into a folder and flipping a software switch à la the File Sharing control panel. This personal server strategy is where Apple has the most chance to add value and make the Macintosh shine above other PCs, rather than chasing the high-bandwidth server market.

With Every Use, a Smile When presenting the Internet on the Mac, Apple must go beyond easy-to-use services and offer convenient ones: services so uncomplicated and handy that it's easier to use them than it is not to. One of the most glaring examples is file transfer—no Macintosh user should ever have to consider compressing or encoding E-mail enclosures or Internet downloads. Apple should ship those services with every Mac. When sending or retrieving files by E-mail or transfer methods, users should have to choose only whether they're talking to a PC or another Macintosh, and the OS should handle the rest.

Apple must also ensure that it quickly and capably implements on the Mac the latest Internet technologies, another area where OpenDoc will help by providing a framework for small, quickly developed components.



Keys to the Internet Cyberdog and OpenDoc form the basis of Apple's ability to quickly incorporate Internet developments deeply into the Mac OS, making it an integral part of the Mac experience.

All these goals are eminently achievable, particularly given the flexibility afforded by OpenDoc and Apple's proven ability to put an elegant face on technology. It's almost laughably ironic that the Internet today is posing many of the same interface and ease-of-use problems that personal computers presented a decade ago. Once again, Apple and the Macintosh stand poised to answer the challenge.

The New PowerBook

PORTABLE, POWERFUL, AND PERSONAL—that's the challenge of making a competitive notebook. As we did in our desktop design, *Macworld* focused on delivering high performance, innovation, and style at a decent price in our notebook, code-named Galileo. For a notebook, decent is still expensive, but the cost is worth it for a top-notch system.

How People Should Interact

Today's notebooks are based on a rare requirement: that the notebook be the same size as a stack of papers so it fits in a standard briefcase and leaves room for another stack. That means a crammed keyboard and small screen. We beg to differ.

Human-Size Interface Our notebook uses a standard-size keyboard, complete with F-keys and cursor controls (the four arrow keys, page up, page down, home, and end) so you can navigate a text document from the keyboard.

Having a large keyboard means there's room for a large LCD panel, which we also offer, running at 800-by-600-pixel resolution. Users can choose between models that have active matrix panels, for top quality, or passive matrix, for lower cost. For better viewing, our panel swivels, so you can orient the LCD to another person, such as when giving a presentation.

Multiple-Choice Input Our keyboard—shaped so it is more ergonomic along all axes—comes standard with a touchpad, the pressure-based system favored by Apple. Also standard is a trackpoint, the little eraser-like puck that IBM introduced several years ago. Both are active, so you can use whichever works best for you at the moment. But even better, the touchpad snaps out, so you can replace it with a trackball or even a joystick. And of course you can always plug a mouse, other pointer device, other keyboard, or numeric keypad into the Universal Serial Bus port.

An Unusual Shape The curved keyboard is made possible by a curved bottom. This curve raises the notebook's screen and keyboard *and* makes the notebook hug your hips when you carry it.

Multimedia Standards The LCD screen remains flat, so when the notebook's closed, the curved bottom leaves a gap on both sides of the notebook. We use those gaps for the stereo speakers to reside in, and they in turn support the LCD screen when the case is closed.

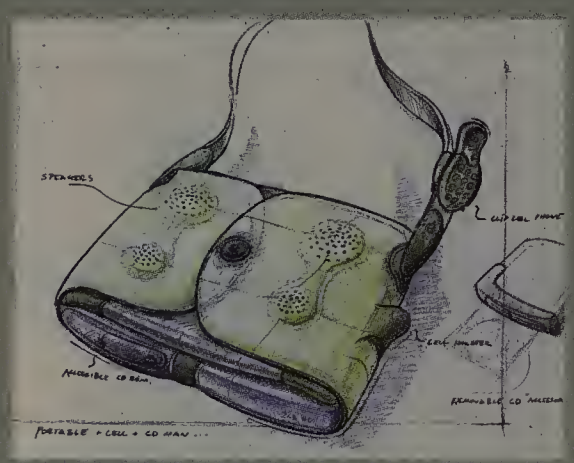
If you have speakers, you should support a CD. And we do. Although our case is flatter than a typical notebook, ultrathin drives still fit. We provide a DVD drive to handle both the new DVD discs and regular CDs. Just like the desktop system, the notebook comes with a remote control for the DVD drive and your presentation software.

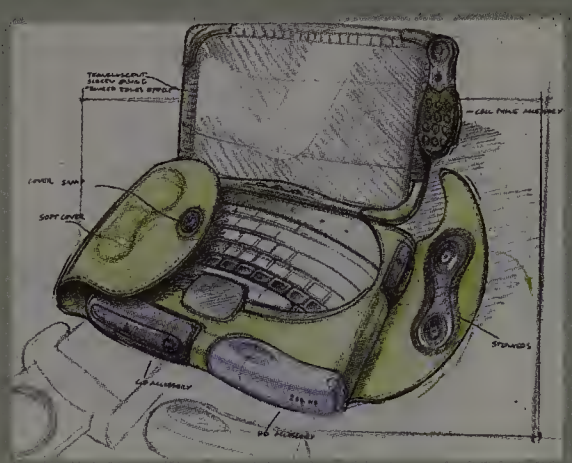
A built-in microphone is standard equipment. And there are RCA audio-input and -output ports, so you can make a presentation or listen to good music. If you have a typical headphone, there's also a stereo miniplug near the LCD panel.

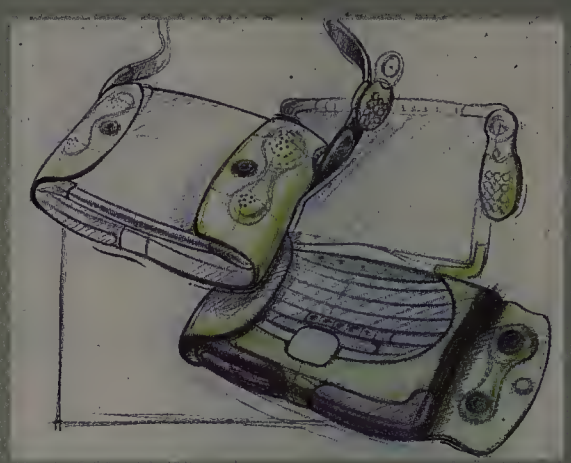
All the Expansion Although its case is slimmer, our notebook provides all the expansion options you've come to demand. All drive bays are swappable, so you can put a CD-ROM drive in the floppy bay or vice versa. Even a Zip drive could be made to fit, although a SyQuest or Jaz drive would be too thick. As in the desktop, we provide an LS-120 floppy drive, supporting both 120MB and 1.4MB disks. Unlike in previous PowerBooks' design, we've put the floppy in the front, so disks don't sail into the airline tray next to you. The DVD drive is likewise up front.

There is of course a lithium-ion battery to provide long usage. And the notebook will be able to accept the forthcoming lithium-polymer batteries that may be available by 1998.

Two PC Card slots let you add networking and modem support. In the back, we have ports matching those in the desktop: Firewire SCSI, high-density SCSI-2, USB serial, RCA audio input and output, VGA video, and infrared. There's also a power switch, a security-lock slot, and a docking connector.







Musical Movement Preliminary sketches from the design process explore ideas for the notebook's speakers.

RAM is easily expandable, using memory cards that will not change in subsequent models (unlike Apple's past approach): just remove the touchpad and keyboard.

A Permanent Home Apple's Duos introduced a good approach to using a notebook both on the road and on your desk: the docking station. But the Duos made compromises when used away from the desk, while Apple's full-size notebooks didn't offer the benefits of docking when used on the desk.

We took a different route. You can get a docking station for our PowerBook, and it connects very simply through the same umbilical as the desktop Mac's drive pod does. In fact, you could connect the notebook directly to our desktop Mac.

Our docking station simply holds PCI cards (three) and drives (two). The notebook does everything else—no compromises when it comes to ability or connectivity. If you want permanent connections from your notebook to the network and other peripherals (like mice and keyboards), you can get an optional port replicator that attaches to the docking station.

Flexible Design For optimal viewing, our notebook lets you swivel the screen. And for optimal listening, the stereo speakers fold out; you fold them back in to make the notebook easy to carry.

When connected, it bypasses the ports on your notebook and routes everything through the umbilical to the dock's ports.

High Performance at a Good Price

While notebooks have extra cost because of their miniaturized components, prices don't have to be outrageous. Again, we use industry-standard components wherever possible.

Fast CPU Rather than stick with the relatively anemic PowerPC 603e series, we considered moving our notebook to the same PowerPC used by the desktop models: the 604e. Alas, it takes too much power and radiates too much heat—and its architecture simply won't allow development of a mobile version, à la Intel's mobile Pentiums. So we selected a 300MHz 603e, which is about as powerful as a 166MHz 604e.

Fast Buses The internal peripheral bus on the notebook is PCI-based, so video, drives, and the like don't get bogged down. The drives themselves use Firewire connectors, again for high performance. We said no to the Enhanced IDE standard that Apple has adopted from PCs—it's fast enough, but why add the expense of a new technology to the motherboard?

The system bus and memory bus run at 50MHz to 66MHz, depending on the CPU speed, supporting fast PowerPCs and RAM, including the new SDRAM used in our desktop Mac. There's no cache card, since SDRAM doesn't need it. As you'd expect, the CPU is upgradable, since it rests on a daughtercard.

The Mac Advantage

As with the desktop, our notebook's main advantage is in the Mac OS, coupled with better interface design and better hardware-and-software integration. Plus it looks terrifically cool.

Full Keyboard The full-size keyboard is curved along both axes to make it more ergonomic. Plus there's a built-in trackpoint to supplement the standard touchpad.

Big Screen A 13-inch LCD panel with 2MB of VRAM offers vivid color at 800-by-600-pixel resolution.

Integrated Audio Fold-out stereo speakers, RCA audio jacks at the back, and a stereo miniplug at the front give the notebook real zing for games, presentations, or music playing.

Long-Life Battery By using lithium-ion with the power-efficient 603e CPU, the notebook gets several hours of battery life.

Status at a Glance LED indicators above the keyboard show you the battery reserves' status any time the notebook is on—no need to fiddle with a utility. Another LED lights when the microphone picks up sound, so you can tell if your voice is being heard.

PC Card Slots As you'd expect, there are two PC Card slots for modems and network connections.

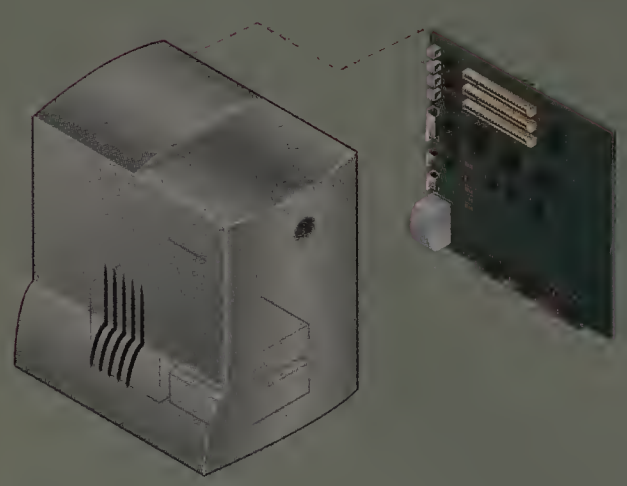
Outside Connections The notebook comes with high performance ports on the back (not shown):

- Universal Serial Bus
- Firewire SCSI
- High-density SCSI-2
- VGA video
- RCA audio input and output
- Infrared transceiver
- Docking port

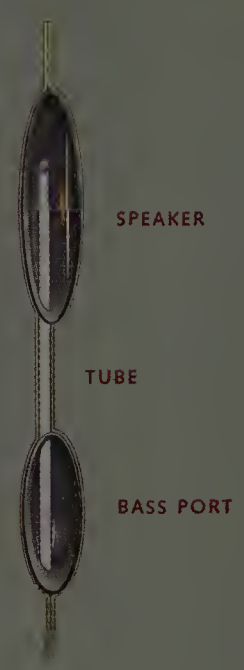
Input Choices While a touchpad is standard, the notebook lets you swap it out for another input device, such as a trackball or joystick.

User-Upgradable Core By removing the keyboard, you can replace the CPU card and add more RAM.

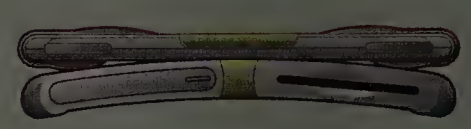
Swappable Storage Media An LS-120 floppy drive and a DVD drive are standard equipment, but both can be replaced with other removable-media drives.



Married to the Desktop If you have a home for your PowerBook to come to, you can use a docking station to add up to three PCI cards and two drives. The station also includes a port replicator that allows you to leave a CRT, mouse, and other devices permanently hooked up. You simply connect the notebook to the dock with the same type of umbilical that marries the desktop system's drive pod and control tower. And, yes, that same umbilical lets you dock a PowerBook to any umbilical-equipped desktop Power Mac.



Super Stereo New flat speakers make room for a larger sound chamber, increasing sound quality tenfold over that of existing notebooks. A long tube carries bass frequencies to another, smaller chamber with a bass port.



Firm Support The curved bottom makes the keyboard more ergonomic. To ensure that the LCD panel is well supported when closed, the speakers, when folded in, act as cushions.

Swivel Display So you can easily show others what's on your screen, the LCD panel tilts side to side.

CONTINUED FROM P. 111 slew of faster CPUs waiting in the wings. Fortunately, thanks to IBM and Motorola, the PowerPC 604 and 603 families should reach speeds as fast as 300MHz by the end of 1997. In fact, the new PowerPC 604e already runs as fast as 225MHz (see *News*, elsewhere in this issue)—faster than any Pentium or Pentium Pro.

To deal with this speed, the entire system must be optimized for performance. Luckily, that's not so hard anymore, with the arrival of fast buses for almost all system components. And because these buses all rely on industry standards, competition in the PC market will keep prices down, even for Macs.

Faster Bus First, there's the system bus itself. PCs reach 66MHz, while the Mac was stuck at 50MHz until this spring, when Power Computing pushed it to 60MHz. In 1997, there's no reason the Mac bus shouldn't work at 66MHz. A speed of 66MHz is great for PCI-based systems: having a system bus that runs at an even multiple of the PCI bus's 33MHz reduces bus-synchronization overhead.

CPUs beyond 200MHz We easily expect to see a version of our proposed Mac system sporting a 264MHz PowerPC 604e, running four times as fast as the system's 66MHz bus.

A New DIMM To keep up with PowerPC CPUs running between 200MHz and 300MHz, the Mac will need fast memory. To handle that need, Apple will provide DIMMs with a new type of memory chip: synchronous dynamic RAM (SDRAM), which can increase memory performance as much as 400 percent in some operations. SDRAM removes the need for a cache card as in today's systems, but a cache slot is retained on the new Macs for people who use today's asynchronous RAM. (The two kinds of DIMMs fit in the same RAM slots.)

Plug and Perform We've put the CPU and its cache on its own card, so you can benefit from faster CPUs as they are developed, without replacing your motherboard. While we like how PC makers have made it easy to replace a slow Pentium with a fast one right on the motherboard, that approach still requires fiddling with DIP switches and jumpers. By putting all the CPU-related components (CPU, oscillator, and cache slot) on a card, we make such upgrades truly plug and play, since the cards will provide the information the motherboard needs to reconfigure bus speeds.

We've extended this approach to multiple CPUs—you can add a second CPU card to the Macintosh, making it a dual-processing system. Or you can replace the single-CPU card with a dual-CPU card and add a second dual-CPU card to get a four-CPU system.

Faster PCI A slew of companies are working on a new version of the PCI bus that takes it from a 32-bit design to 64 bits. Apple has also been urging such a change. Having 64-bit PCI means that throughput could double to a theoretical maximum of 267 MBps. Our Mac uses the new 64-bit design, which means that an adapter will be required to connect today's 32-bit PCI cards into the new 64-bit slots. Our case leaves headroom for such an adapter.

We have six 64-bit PCI slots in the control tower, so you can load your Mac with high-performance options.

Fast Video A fast system with mediocre video display is a waste, so we've put high-speed video-display circuitry on the motherboard (with 2MB of VRAM standard for thousands of colors on a 17-inch display, upgradable to 8MB maximum for fast display of millions of colors on a 21-inch display).

We've also put a QuickDraw 3D accelerator on the motherboard, which will all but make this intriguing technology a new, widely installed standard, so that developers know they can safely incorporate support for it in their products.

Centered Around You The Power Macintosh designed by *Macworld* in consultation with Frogdesign focuses on how the user interacts with the Mac, incorporating multimedia peripherals and ergonomic input devices.

In another attempt to encourage a key video technology, we include an MPEG-2–playback accelerator chip on the motherboard, to make full-motion video possible for everyone. Intel's next generation of Pentiums, the P55C series (due in early 1997), will include on-chip acceleration features to boost 3-D and MPEG performance, so Apple should do at least as well.

Fast Storage Today's SCSI is out and Firewire is in. Don't be fooled by the slim cable and port: Firewire carries power directly to devices and delivers 2.5 times the speed of SCSI-2, with cables as long as 4.5 meters (versus SCSI-2's 1m). That's more than sufficient for most uses, even in digital video and multimedia. For faster performance, we expect to see people use Fiber Channel cards and connectors; this SCSI variant is 10 times as fast as SCSI-2 and supports cables as long as 100m. Both Firewire and Fiber Channel are hot-pluggable, so you can add and remove devices without rebooting.

Of course, there's a huge number of SCSI-2 drives out there, so we include both external and internal SCSI-2 connectors for compatibility.

Fast Communication To complete the performance features, our system includes a 100-MBps Ethernet connector that also works automatically with today's standard 10-MBps Ethernet lines. The Ethernet circuitry is on the motherboard.

The PCI card–based 33.6-Kbps fax modem with integrated telephony features, mentioned earlier, rounds out the communications-oriented performance features.

The Mac Advantage

So far, everything we've described could as easily be added to a Windows system. So why a Mac? That's a question Apple really needs to answer. Let's help out.

- Greater ease of use. An integrated hardware-and-software design has always been a key Mac strength, and Mac OS 8 had better take smooth advantage of all these technologies.

Neither Windows 95 nor Windows NT does yet, but they're trying. Ease of use also comes from the industrial design—the hardware interface—and our design makes everything as simple and straightforward as possible: easily accessed ports, wireless technologies, flexible configuration, elimination of clutter.

• Real solutions. Our in-the-box telephony support will let Macintosh users take advantage of the computer as a communicator, just as the late-1980s Macs made publishing a natural Mac endeavor.

Apple can go a step further here and include a bundle of software that lets you use the Mac out of the box. Such a bundle shouldn't be one of those everything-but-the-kitchen-sink CDs that overwhelm most buyers, but a well-conceived set of integral programs. What should Apple include?

• Forget SimpleText—bundle a good midrange word processor from Claris that supports the latest Microsoft Word.

• Ditto for faxing: Mac fax programs are mediocre, so Mac OS 8 should include faxing in its standard print services.

• Apple should also include basic utilities for data protection and recovery—not to compete with Symantec and Dantz Development, but to assure a basic level of security. In fact, it should include "lite" versions of these companies' products, with the full version on CD that you can unlock after paying by credit card via a toll-free number.

• And, of course, an Internet browser and V-Twin search engine should be integrated into the Finder.

With these kinds of built-in technologies, Apple would make the Mac platform richer in new areas, beyond its graphics base. For example, imagine what you could do with a PaperPort-type scanner integrated into a keyboard, document management supported by Mac OS 8's V-Twin searching, and OS-level faxing. More power to communicate.

Apple succeeds by being first with the best, not by creating technologies for their own sake. The PC industry copies Apple, and the Mac community grumbles. Why? Imitation is the sincerest form of flattery. Keep the flatterers busy. m

VISION BECOMES REALITY | The Journey to the New Macs

Innovation isn't easy. The two systems you see on these pages are the results of months of research and analysis. *Macworld* began this effort in fall 1995, after it was clear that Apple really would move to the new CHRP design for future Macs. That begged the question: How could Apple use an industry-standard platform and still offer innovation worthy of the name Macintosh?

We assigned two *Macworld* journalists highly knowledgeable in systems technologies—senior informational graphics designer Arne Hurty and executive editor Galen Gruman—to interview engineers throughout the Mac and PC communities, to assess where systems technologies are heading and how they might fit into the CHRP platform and the Mac's ambitions.

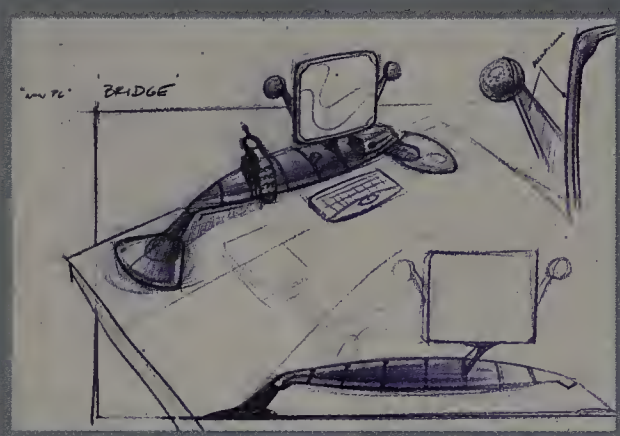
With a basic architecture in mind, Hurty and Gruman consulted with other *Macworld* journalists savvy in specific technologies, such as 3-D, storage, and communications. These included editor-in-chief Adrian Mello, senior editors Charles Piller and Howard Baldwin, associate editor Cameron Crotty, assistant editor Jim Feeley, and contributing editors Jim Heid and Cary Lu. They also consulted with Macworld Lab's experienced analysts, including lab director Lauren Black, senior analysts Mark Hurlow and Jeff Sacilotto, and analyst Chris Uiterwijk.

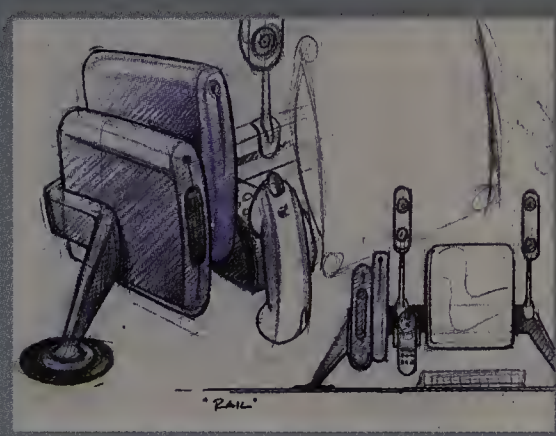
With the technical details ironed out, *Macworld* contacted Frogdesign—whose product designs include the original Macintosh in 1984, the Next machine in 1990, and the Acer PC in 1995—to develop an exterior for our new Macs. At Frogdesign, a team of designers created sketches of possible looks. The Frogdesign team met with *Macworld*'s Hurty, Gruman, designer Tim Johnson, and art director Joanne Hoffman to hash out the final designs.

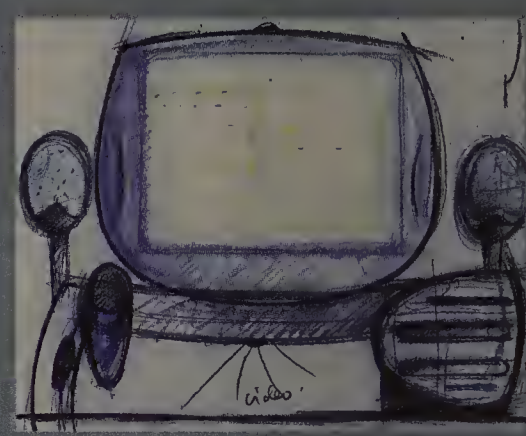
At that point the real hard work began. In the following week, all the designers furiously worked on sketches, refining the vision. Then a team of model makers at Frogdesign worked day and night for three weeks to produce physical models of the two new Macs—a breakneck pace even by the computer industry's standards.

Meanwhile, *Macworld*'s Hurty drew the technical illustrations of the new Macintoshes' insides and Gruman wrote the bulk of the article (Crotty wrote the segment on Internet technologies). Johnson created the article layout, ensuring that the photography directed by Hoffman, the illustrations, and the text combined to be greater than the sum of the parts.

Meanwhile, *Macworld*'s Feeley produced a Web page featuring images you can download, message boards, and other explorations on these new designs. Go to the page via Macworld Online (*http://www.macworld.com*).







Early Approaches The exterior design of our new Mac went through several looks. The sketches here are some of Frogdesign's early concepts. All emphasize the separation of the everyday devices from the rest of the system.

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SoftWindows for Power Macintosh

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Circle 68 on reader service card

4:45 PM Sending my 48 meg file to be printed.
Color calibrating? Three clicks, all done.
Traps and overprints? They all showed up.
Revisions? OK, so I'm a little obsessive.
The comp? It actually matches the screen.

5:00 PM "What's next? I'm out of here."

6 ppm: The Xerox MajestiK 5765 Digital Color Copier/Printer

9 ppm: The Xerox Regal 5790 Digital Color Copier/Printer

40 ppm: The new Xerox DocuColor 40 Digital Color Production System

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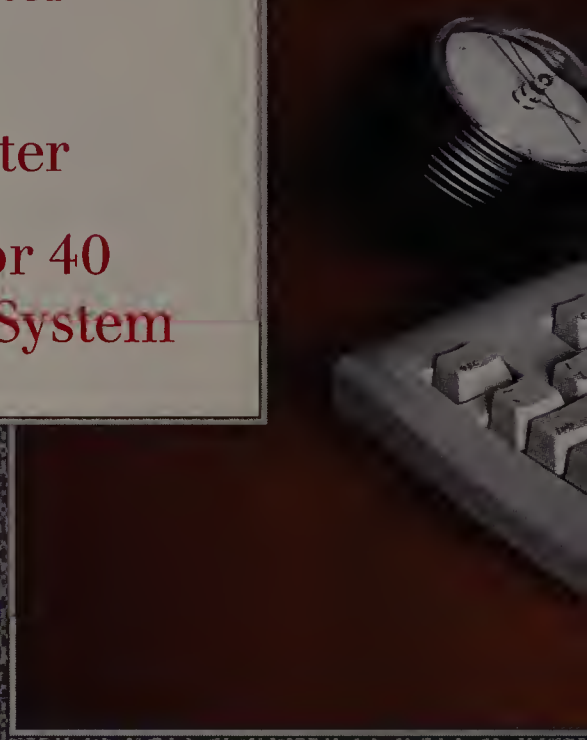

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Top 20 Photoshop Plug-ins

by Deke McClelland

SPARK YOUR CREATIVITY WITH THESE ESSENTIAL IMAGING ASSISTANTS

IF YOU'RE ONE OF THE MANY ARTISTS AND PHOTOGRAphers who turn to Adobe Photoshop on a daily basis, you know the value of a good plug-in. With these sturdy little utilities, you can bolster Photoshop's capabilities in ways the program's developers never imagined. Better yet, you can pinpoint a specific feature that suits your individual needs. Install the plug-ins you need, throw away the ones you don't. Plug-ins permit you to design a personalized, comfortable, and more productive working environment.

After plowing through a plethora of plug-ins, *Macworld* rounded up what we consider to be the 20 most capable, exciting, and essential imaging assistants. To help make sense of such a wide range of functions—no two plug-ins from our selection entirely overlap—we group these products into four categories. Some increase your artistic productivity, others apply eye-popping special effects. The third group creates three-dimensional type and textures, and the fourth affects color output. About the only thing they all share is that every one of them is good enough to be an Editors' Choice selec-

tion. Coincidentally, these plug-ins also happen to be uniformly affordable. Only one retails for more than $200. Most cost less than $100, and one-third are freeware or shareware. And to the continuing exasperation of Windows artists the world over, roughly half of these plug-ins are available only for the Mac. Shucks.

The prevalence and quality of plug-ins are excellent news for digital artists and photographers. These utilities demonstrate that we work in a flexible environment that's every bit as expandable as the Macintosh system software. Just one word of caution: you should load only those plug-ins you need for each session. Many plug-ins are hungry for memory and take space that could hold and process your images. To comfortably run all 20 of the products in this article, Photoshop would need about 60MB to 70MB of application RAM.

On the other hand, Photoshop can most likely run two or three of these collections at a time without causing a compromise in performance. Set your sights on a few specific goals, and you should be able to expand your creative potential without burdening the host.

Productivity Performers

★★★★/7.7 **PhotoMatic 2.0.1** Automates operations by adding batch processing and AppleScript support. **Company:** DayStar Digital (770/967-2077, *http://www.daystar.com*). **List price:** Available online as freeware.

★★★★/7.4 **Intellihance 2.0.1** Corrects scanned images and digital snapshots so simply, a child could use it. **Company:** Extensis (503/274-2020, *http://www.extensis.com*). **List price:** $99.95.

★★★★/7.4 **Kwick Mask, Create B/W, and Rotate Color** These are three useful filters that preview effects directly inside the image window. **Author:** Hugh Kawahara (*http://www.stanford.edu/~kawahara*). **List price:** Available online as freeware.

★★★/6.9 **PhotoNavigator** Provides a thumbnail view of an image for quick and easy scrolling. **Company:** Extensis (503/274-2020, *http://www.extensis.com*). **List price:** Available online as freeware.

★★★/6.8 **Chris' Filters** A heaping helping of productivity with a few special effects thrown in. **Author:** Chris Cox (*cc4b@andrew.cmu.edu*). **List price:** Available online as shareware.

Productivity

Productivity tools are the Sergeant Fridays of Photoshop plug-ins—no flash, no pretensions, just plain and simple efficiency. Happily, these practical tools are inexpensive even by the standards of this article—most are free.

PhotoMatic 2.0.1 Whatever the future may hold, Photoshop 3.0.5 does not support AppleScript or any other type of scripting. If you want to automate multistep operations—whether batch-processing scans or correcting CMYK images—you need to look outside Photoshop to a plug-in like DayStar's PhotoMatic. Assuming you have AppleScript installed, PhotoMatic adds a Record item to Photoshop's menu bar. You can then record your operations and save them to disk as AppleScript files. PhotoMatic displays all scripts in a submenu, affording easy playback, and a stand-alone utility permits you to batch-process images.

At its core, PhotoMatic is strictly a recording and playback engine; if you want to add timed pauses or otherwise modify your script, you have to edit it with Apple's Script Editor utility. But such small suffering can be overlooked in light of the fact that DayStar provides PhotoMatic for free, in exchange for adding your name to its mailing list. Simply put, a welcome addition to any plug-in library.

Intellihance 2.0.1 If you do a lot of work with Photo CDs or digital cameras, you know how drab and soft your images can look when you first open them up in Photoshop. Extensis's Intellihance is designed to pump up the colors and sharpen the focus with as little input as possible from you.

The program gauges the histogram and edge detail of an image and automatically adjusts gamma (the median gray value), boosts saturation, and applies unsharp masking according to its best guess. It couldn't be easier to use; if you're willing to put your faith in the software, you can just choose the Intellihance command and press the return key. My one complaint is that Intellihance doesn't account for color cast (see the screen shot "Skull and Moss Tones").

Kwick Mask, Create B/W, Rotate Color While you can find a wealth of freeware and shareware filters on the Web, many don't take advantage of the Power Mac's floating-point speed, some duplicate Photoshop 3's built-in capabilities, and others are just plain awful. Hugh Kawahara's three freeware offerings are delightful exceptions. First, all three preview effects directly inside the image window—a feat plug-in developers commonly consider to be impossible. And second, they're all very useful. Create B/W lets you control the way Photoshop mixes the RGB color channels to create a gray-scale composite. If you do a lot of black-and-white printing, this filter is a must. The Rotate Color filter cycles hues around the spectrum without the artifacts that Photoshop's Hue/Saturation command produces. But the best of the bunch is Kwick Mask. Like Photoshop's Color Range command, Kwick Mask lets you select an image according to its brightness values. But you can also soften the selection of some colors independently and adjust selected areas with precision.

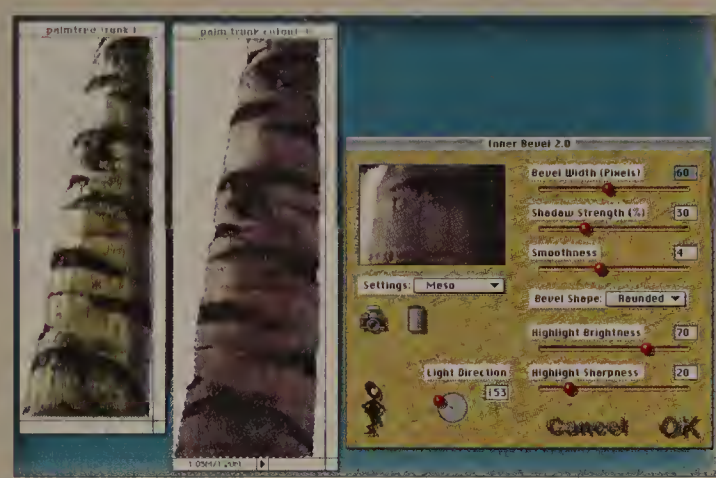
Skull and Moss Tones Intellihance imbued this underexposed picture, shot with a Chinon ES-3000 digital camera, with vivid colors, snappy contrast, and sharp focus (center). I had to get rid of the mossy-green color cast and restore the warm rock hues on my own (right).

PhotoNavigator PhotoNavigator permits you to scroll quickly inside a large document by dragging a rectangle (which represents the visible area) inside an 8-bit thumbnail. Provided free as a taste of the upcoming PhotoTools filters, PhotoNavigator appears as a floating palette, always available on screen. So long as you never update the thumbnail to reflect your changes—and instead leave it as a static representation of the original image—PhotoNavigator works quite well. But if you insist on updating periodically, you'll run into some minor irritations. The redraw is slow, the image shows just the contents of a single layer, and you can't undo the last operation. Beyond that, PhotoNavigator is the perfect tool—ready and easy to use, and priced to sell.

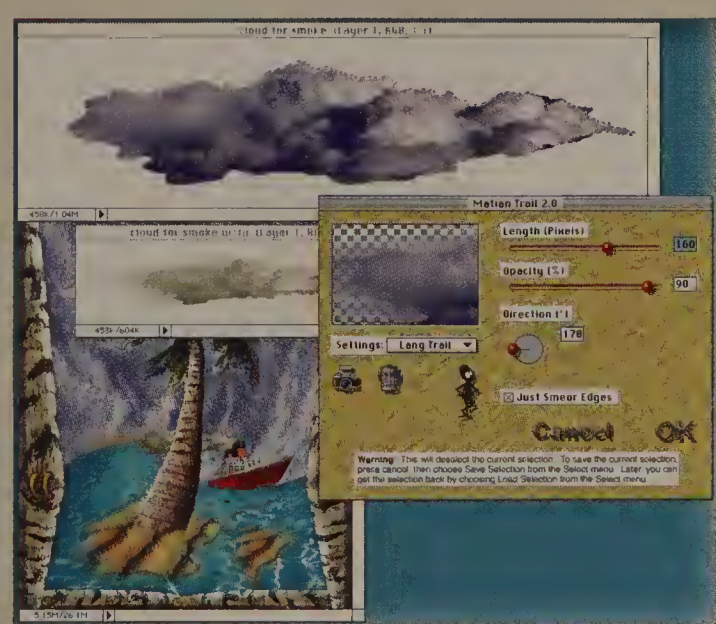
The Black Box

PERFECTLY **PRACTICAL** EFFECTS

(A)



(B)



(C)

ARTIST DAVID PETERS DISMISSES THE NOTION THAT PHOTOSHOP filters are a crutch for folks who simply want to achieve prefab effects. "Sure, filters are automated, but so is the computer," he says. "Both are tools that encourage artistic exploration and advance creative thinking." Peters clearly used Alien Skin Software's The Black Box filters to full advantage to reinforce his tropical motif.

After applying Photoshop's Perspective and Twirl effects to distort sky and water images, Peters used The Black Box's Swirl filter to inject rhythmic patterning into the clouds **(A)**. He chiseled out his border by applying the Inner Bevel filter to a bit of palm trunk **(B)** and duplicating the result around the perimeter. To create the ocean liner's smoke, he smeared some more clouds with the unidirectional Motion Trail filter **(C)**.

Despite a few mild criticisms—the filters performed sluggishly on his Mac IIfx, and he wanted to restore unsaved settings—Peters was ultimately satisfied with The Black Box.

Kai's Power Tools

WHAT A STRONG, STRANGE TRIP IT IS

JOHN HERSEY IS HOOKED ON KAI'S POWER TOOLS. "I THINK IT'S absolutely amazing—I'm just blown away by how trippy it is. If Jimi Hendrix were still alive, I'd make a poster and send it to him." But as Mr. Hendrix is otherwise occupied—perhaps enjoying a world even stranger than KPT—Hersey concocted this otherworldly scene for us. "I think we're watching some kind of TV tuned in on an alien planet. 'Look everyone, the probe has discovered a Dr. Seuss tree!'"

Hersey used Specular International's Infini-D to construct the basic three-dimensional form with black-and-white stripes. He added a wavy pattern from KPT's Texture Explorer and colorized the tree blue with Photoshop's Hue/Saturation command (A). He created the red globules using one of the factory settings from the Spheroid Designer (B). "I'd have been insane to pass up all that expert spheroid research they've already done for me." Finally, Hersey overlaid another texture and added a highlight around the tree to clearly distinguish it from the fluorescent background (C).

"I kept the basic shapes simple to support the wild effects," Hersey explained. "Once you have a basic image to work with, you can have fun with the filters without overwhelming the viewer." Hersey's ultimate opinion of KPT is about as accurate as any we've heard: "It's not a practical tool, but it sure is cool."

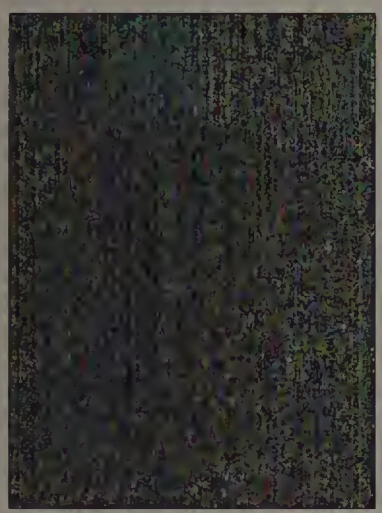
(A)

(B)

(C)

Chris' Filters Chris Cox's collection of 25 shareware plug-ins spans the gamut from productivity tools to special-effects filters. While not all of the plug-ins are as consistently useful as Kawahara's, the good ones easily justify the price (which Cox leaves up to you). The Grid filter creates a regular grid of lines; apply the filter to an independent layer and you're ready to align text and other selections. The Unalias filter softens an image with far more subtlety than Gaussian Blur. The Add More Noise filter lets you apply noise according to hue.

My favorite special-effects filter is Psycho, which maps colors differently every time you choose the command; if you don't like an effect, undo it and try again. None of the filters include previews—a definite disadvantage—but Cox's documentation shows how to get the most out of each filter.



The Perfect Disguise When you open an image encrypted with Naoto Arakawa's filter, it looks like a mess of random pixels (left). But if you choose the filter and enter the correct password, the pixels reassemble into a recognizable configuration (right).

Special Effects

Special-effects filters don't help you get work done, they rarely satisfy a specific need, and their effects can be a bit heavy-handed. But they're a lot of fun to use.

The Black Box 2.0 Of all the special-effects collections, The Black Box, by Alien Skin Software, is the one I turn to most often. Though its feature set is modest and some of the filters—notably Drop Shadow and Glow—are downright prosaic, I find that I can get more accomplished in a shorter amount of time using The Black Box than with any of its competitors. To raise a selected item so it appears to pop up from the page—like the letter on a license plate—you specify the size and softness of the bevel, the lightness and darkness of the highlights and shadows, and the direction of the light source. No option is missing, and every option is manifest in purpose and operation.

Kai's Power Tools 3.0.2 Kai's Power Tools, by MetaTools, is virtually the exact opposite of The Black Box. Everything about this collection—from its clever dialog boxes to its elaborate network of buttons and options—is designed to dazzle the user. As a result, KPT manages to keep most artists pretty well entertained while they work. KPT is also bulging with features, permitting you to create an infinite variety of textures and gradations, project images onto 3-D spheres, repeat images in vortex patterns, and otherwise distort life beyond all recognition. On the downside, the previews can be inaccurate, and the dense interface sometimes interferes with your work.

Paint Alchemy 2.0 Xaos Tools' Paint Alchemy automatically turns an image into a work of impressionism by repeating a series of 8-bit brushstrokes over the course of a selection. You can vary the angle and size of brushstrokes according to image attributes such as hue, saturation, and brightness. And you can assign blend modes to mix overlapping brushstrokes. If you have Adobe Premiere handy, you can use Paint Alchemy to animate images over time.

Admittedly, Paint Alchemy is something of a one-hit wonder, but this is one hit that gets better with age. At $199, the price is high, and I wish you could edit brushstrokes directly inside the filter, but otherwise this is a terrific tool.

Lumpy Noise Back in 1993, Paul Badger wrote three freeware filters, two of which are now predictably showing signs of age. Luckily, the third filter, Lumpy Noise, justifies downloading all three and tossing the other two. This filter generates noise particles larger than a single pixel, a much-needed feature in Photoshop. You can control the lumps' size and depth, the distance between them, and the randomness of the effect. It's like a pared-down version of Paint Alchemy—applying blotches instead of brushstrokes—with the obvious advantage of price. Granted, the filter is a little slow and I wish it offered a preview, but for free I can deal.

Gallery Effects Adobe's 3-volume set of 48 unrelated filters is best characterized as three-quarters fluff and one-quarter serious effects. The dozen or so good filters include Mosaic, which imposes irregularly shaped tiled edges; Conte Crayon, which applies a rough paper texture; and Stained Glass, which separates an image into a series of colored polygons with heavy outlines. Too many of the filters bleed away the colors, and all three volumes rely on clumsy controls. But for the price, a dozen useful filters is a good deal. For $49 you can purchase any single volume (in which case I recommend Volume 3); for $99 you get all three volumes. At that price, you can sift through the clutter and pick out the gems.

Especially Effective

★★★★/7.9 **The Black Box 2.0** Straightforward filters for creating drop shadows, bevels, and glass refraction effects. **Company:** Alien Skin Software (919/832-4124, *http://hoople.catalogue.com/alienskin*). **List price:** $119.

★★★★/8.3 **Kai's Power Tools 3.0.2** Excellent gradient and distortion filters wrapped in a fanciful, sometimes bizarre interface. **Company:** MetaTools (805/566-6200, *http://www.metatools.com*). **List price:** $199.

★★★★/7.7 **Paint Alchemy 2.0** Applies tiny brushstrokes to create impressionistic effects. **Company:** Xaos Tools (415/487-7000, *http://www.xaostools.com*). **List price:** $199.

★★★/6.9 **Lumpy Noise** Free plug-in applies a coating of thick, chunky noise. **Author:** Paul Badger (*pbadger@cgrg.ohio-state.edu*). **List price:** Available online as freeware.

★★★/6.5 **Gallery Effects** At least a dozen useful edge-enhancement and texture filters (of 48 in all) priced to sell. **Company:** Adobe Systems (415/961-4400, *http://www.adobe.com*). **List price:** $99.

★★★★/7.5 **KPT Convolver 1.0** Provides an infinite range of focus, edge-detection, and color embossing effects. **Company:** MetaTools (805/566-6200, *http://www.metatools.com*). **List price:** $199.

★★★/6.6 **Sucking Fish 1.01** Offbeat, undocumented gradient and pattern filters with encryption as an added bonus. **Author:** Naoto Arakawa (*gca00443@niftyserve.or.jp*). **List price:** Available online as freeware.

KPT Convolver 1.0 If you've always wanted to make sense of Photoshop's Custom filter but couldn't master the math, then MetaTools' KPT Convolver is for you. Convolver can't achieve a single effect beyond what you can accomplish with the native Custom filter, but even if you're a math whiz, the plug-in offers the advantages of convenience, flexibility, and a structured interface. This three-tiered filtering system permits you to custom-design sharpening, blurring, edge-detection, and color emboss effects. Each tier builds on its predecessor, allowing you to select a rough effect, refine it, and apply final touch-ups.

As with Paint Alchemy, $199 seems like an extreme fee for such a narrowly focused plug-in. And yet Convolver is more capable than the entire Gallery Effects collection simply because it doesn't impose any arbitrary limitations. Convolver also boasts the silliest gimmick of any of the plug-ins: it rewards you with up to five additional features as you become more adept at using its controls.

Sucking Fish 1.01 Japanese programmer Naoto Arakawa's Sucking Fish collection of offbeat filters is bereft of English-language documentation; for the record, the DekoBoko filter creates a beveled rectangle, and Mr. Sa'Kan projects an image onto a brick wall. More practical are the Frame Curtain and Magical Curtain filters, which cover selections with multipoint gradations. They work like the Gradient Explorer filter in Kai's Power Tools, but the gradations alter the brightness of an image rather than applying colors. My favorite Sucking Fish filter isn't a special effect at all. Inai-Inai-Bar encrypts an image by converting it into a seemingly random collection of pixels (see the screen shot "The Perfect Disguise"). When you enter the correct password, the filter puts the image back together again.

3-D, Type, and Textures

Everyone knows Photoshop can't create three-dimensional graphics, although many artists wish it could. The idea of never having to leave Photoshop for any of your imaging needs is awfully appealing, and several plug-in vendors are working to make that idea a reality.

TypeCaster 1.0 Xaos Tools' TypeCaster enhances Photoshop's text capabilities in a big way, by making it possible to add fully rendered 3-D characters to any image. Though hampered by a simplistic text-entry function that prohibits custom kerning, TypeCaster provides a wealth of 3-D positioning and rendering capabilities. You can scale and spin the text in 3-D space, adjust the depth of the letters, and switch between concave and convex bevels. Like Paint Alchemy—also from Xaos Tools—TypeCaster sports a flexible interface that lets you juggle many dialog boxes at a time and update the preview from inside any dialog box with a keystroke. TypeCaster also provides a large selection of surface textures and plenty of lighting controls so you can make your characters look just right.

Series 2, 3-D Filter 2.11 Series 2, 3-D Filter, by Andromeda Software, is all you need to project images onto three-dimensional surfaces. You can map a selection onto a plane, box, cylinder, or sphere. Precise slider-bar controls allow you to position and rotate the 3-D shape exactly. The downside is that the sliders demand a fair amount of technical knowledge, and you can't simply drag the primitive around inside the wire-frame preview. Although you're permitted just one light source, the ambient-light functions are excellent. And the filter supplies two much-appreciated preview functions, one quick and one accurate. I wish the filter automatically generated a mask around the shape so you could more easily float it in front of a background image. But for those up to the challenge, Series 2 is the best 3-D–projection tool around.

CyberMesh 1.11 Written by John Knoll, one of the original designers of Photoshop, Knoll Software's CyberMesh exports a gray-scale image in the DXF file format popular with 3-D models. Each pixel in the image becomes a separate polygon whose depth varies according to its brightness. (This means low-resolution images are preferable, though you can always adjust the export resolution from inside the CyberMesh dialog box.) When the program is extruding the polygons, light pixels in the image move outward and the darker shades recede, just as

A Bumpy Export Here I've used CyberMesh to map a 192-by-130-pixel gray-scale image (top) around a cylinder (bottom). The original image appears childishly crude, yet it yields a surprisingly realistic effect when rendered as a three-dimensional bump map. The brightness values in the image translate to variations in depth, so the white handles stick outward and the dark spots bend inward to form into dents.

Dimensional Dynamos

★★★★/7.5 **TypeCaster 1.0** Adds three-dimensional text to any image. **Company:** Xaos Tools (415/487-7000, *http://www.xaostools.com*). **List price:** $199.

★★★★/8.2 **Series 2, 3-D Filter 2.11** Projects images onto three-dimensional cubes, spheres, and cylinders. **Company:** Andromeda Software (805/379-4109, *http://www.andromeda.com*). **List price:** $129.

★★★★/8.0 **CyberMesh 1.11** Exports gray-scale images as three-dimensional DXF models. **Company:** Knoll Software (415/453-2471, *jknoll@aol.com*). **List price:** $49.

★★★/6.1 **Bump 1.0** Applies shadows and highlights to an image according to the contents of a mask channel. **Company:** AtoZ Software (*atozsoft@aol.com*). **List price:** Available online as shareware, $10.

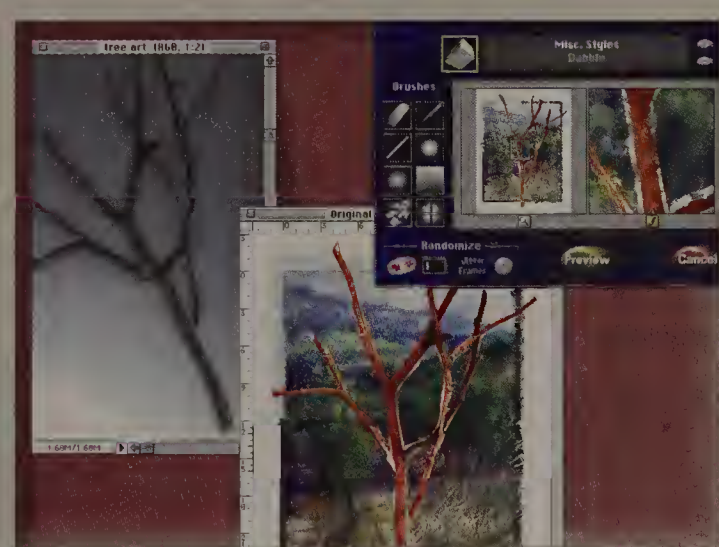
★★★/6.8 **Terrazzo 1.0** Repeats images to create seamless, organic patterns. **Company:** Xaos Tools (415/487-7000, *http://www.xaostools.com*). **List price:** $199.

Paint Alchemy

A MILLION SCRUBBING BRUSHES

(A)

(B)



(C)

ACCORDING TO ARTIST ANDREW FAULKNER, XAOS TOOLS' PAINT Alchemy is the perfect filter for filter haters. "I usually prefer to create my own effects. But Paint Alchemy is more of a fine art tool. It gives you realistic canvas textures and brushstrokes."

Faulkner created his atmospheric background by dividing an Italian vineyard into quarters and applying different effects to each. For the top right quadrant, he selected a sponge brush and randomized the angle of the brushstrokes to establish a natural, oil-painting effect **(A)**. To imitate the density and color of real canvas, the artist tightened the brush spacing with Paint Alchemy's Coverage feature and applied a tint from the Color dialog box **(B)**. Making the most of our tree theme, Faulkner roughed out his foreground tree by plunking some branches on a scanner. He then colorized the branches in orange and applied Paint Alchemy's Dabble brush to blot the tree into its background **(C)**. "Paint Alchemy lets you give an unremarkable photo some flair," he says.

with a standard 3-D bump map. You can extrude with respect to a flat plane, a cylinder, or a sphere (see the screen shot "A Bumpy Export"). You can also rotate the object in 3-D space, adjust the depth of extrusion, and monitor the results in a real-time preview.

Bump 1.0 AtoZ Software's Bump is a straightforward filter that applies depth to an image based on the contents of the first channel that contains a mask. For example, if you want to create the effect of text protruding from an RGB image, switch to the fourth channel—it has to be channel 4—and enter white text against a black background. Then activate both image and channel by shift-clicking on the RGB item in the Channels palette, and choose the Bump filter. You can specify the size of the bevel, the highlight and shadow intensity, and the light source direction. It's a basic effect, to be sure, but for all its simplicity, only Bump makes allowances for the softness of the edges in your mask.

Terrazzo 1.0 Xaos Tools' Terrazzo is one of those filters that make you curse with frustration one minute and chortle with glee the next. It permits you to generate an enormous range of repeating patterns. The patterns don't have to repeat in rectangular formation, as with desktop patterns and the like. You can assign any of 17 symmetries, some based on rectangular tiles, others on triangles, and still others on diamonds. It's like having a kaleidoscope that accepts mirrors of different shapes and sizes.

Terrazzo is a mesmerizing tool. Yet, if I were in charge, there are a few things I'd change. You can't scale an image from inside Terrazzo, and you have to extract your pattern from the selected area or load a PICT file from disk. But when you end up with such awesome results, it's easy to forgive a few minor flaws in implementation.

Color and Printing

Photoshop's built-in color-correction and printing capabilities are widely regarded as some of the best, but even the best can stand some improvement. These plug-ins expand your color and output options.

PhotoLab 1.2 Based on the old FotoMagic filters from Japan-based Ring of Fire, Cytopia Software's PhotoLab is a collection of color-adjustment filters that go beyond Photoshop's Levels, Curves, and Variations commands. All eight filters bring up dialog boxes that offer before and after previews—albeit too-tiny ones. You can also save your settings for later use and access the settings from convenient pop-up menus (rather than having to go back out to disk).

Many filters are knockoffs of Photoshop's endemic color features, merely repackaged to make them more accessible. Others bring entirely new capabilities. For example, CSI Noise lets you control the color and saturation of random noise particles, while CSI GradTone lets you replace brightness values with ramped colors to create duotone overlays and other effects. Some filters could be combined (such as Levels and Negative), and I for one would appreciate printed documentation. But if you spend more time correcting photos than compositing them, $99.95 is a small price to pay for such agreeable inroads to better color.

Series 3, Screens Filter 1.4 Andromeda's Series 3, Screens Filter is a superbly executed plug-in that generates alternative halftoning patterns such as mezzotints and wavy lines. The filter offers two sets of options, one for novices and another for experts. The novice options involve choosing a preset pattern and appraising its effect in the customizable preview. The expert options permit you to adjust the number of lines (also known as worms) per inch, the wave length and height, and the mix of pattern and original image colors. You can also apply unsharp masking to the image from inside the filter to draw out edge details and punch up the contrast. Because the filter changes the actual image (rather than merely the way it's printed), you can mix and match patterns to create traditional engraving effects, or retouch the patterns by hand (see the screen shot "A Glass of Worms").

A Glass of Worms After applying a 40-line-per-inch mezzotint to this CMYK image using Andromeda's Series 3, Screens Filter, I manually erased the stray dots and lines—known as worms—outside the glass using the block eraser. I also added cyan-to-magenta gradations along the outside and repeated the mezzotint.

PlateMaker 1.0.2 The great printing omission in Photoshop is spot colors. Although you can use Pantone and other spot colors to render gray-scale images as duotones, color images must go the way of CMYK. Currently, no plug-in permits you to add spot-color plates and view them on screen, but one plug-in—PlateMaker, by A Lowly Apprentice Productions—does the next best thing: it exports up to 16 channels in addition to the CMYK plates to DCS (Desktop Color Specification) 2.0, a variation on the EPS format supported by QuarkXPress and other publishing applications. You have to set up the channels manually and imagine what they look like; PlateMaker handles just the export. The relatively high price and narrow focus of this product limit its appeal, and you'll need a fair amount of expertise to avoid the pitfalls of oversaturation. But the program is well executed, supporting custom halftone screens and clipping paths. m

Contributing editor DEKE McCLELLAND is author of *The Illustrator 6 Book* (Peachpit Press, 1996) and *Macworld Photoshop 3 Bible* (IDG Books, 1994).

Color Crusaders

★★★/6.5 **PhotoLab 1.2** These color-correction filters take up where Photoshop's built-in capabilities leave off. **Company:** Cytopia Software (415/364-4594, *http://www.cytopia.com*). **List price:** $99.95.

★★★★★/9.2 **Series 3, Screens Filter 1.4** Converts an image into alternative halftone patterns from mezzotints to wavy lines. **Company:** Andromeda Software (805/379-4109, *http://www.andromeda.com*). **List price:** $159.

★★★/6.2 **PlateMaker 1.0.2** Exports CMYK with spot-color channels to DCS 2.0 format. **Company:** A Lowly Apprentice Productions (619/438-5790, *support@alap.com*). **List price:** $295.

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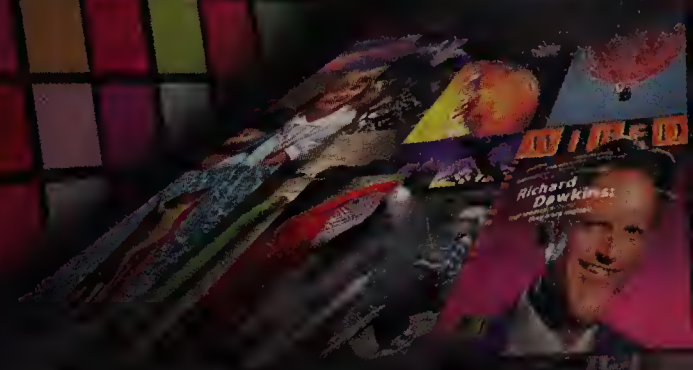

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Circle 19 on reader service card

BY PETER M STOLLER

DESKTOP

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Move CD-Recordable

Drives within Reach

THESE THIN, FLAT DISCS ARE ROUGHLY the size of a coaster, but they hold a lot more than a drink. One compact disc holds six times the amount of data a Zip cartridge does, for half the price. They're less susceptible to damage and last longer than any other data-storage medium. They can be read by almost any desktop computer. They're not fast, but they easily outpace floppy disks and tape.

For these reasons and more, CDs have quickly become one of the most popular data-storage media. Imagine storing 600MB of TIFFs on 15 44MB SyQuest cartridges (at $40 apiece) instead of on one blank $7 CD, or trying to distribute software in any of countless incompatible removable-media formats,

CD RECORDERS

and you've got just a hint of why CDs are hot.

In fact, until recently, CD-ROM technology had just one major limitation: you couldn't record CDs yourself. Well, you could if you could afford it. Just two years ago, you needed at least $3000 for a CD-recordable (CD-R) drive and $1500 for a 2GB drive—not to mention the cost of a Macintosh Quadra—plus the patience to deal with real-time recording and confusing, unreliable software. Most of us preferred to wait.

That wait is over. Power Macs are on sale for under $1000, 2GB hard drives are under $500, and CD-R vendors are delivering external drives with pumped-up performance and street prices as low as $900 (look for a major clone vendor to bundle an internal CD-R drive this year). The most popular bundled software makes it easy to create discs in a wide variety of formats—even audio CDs for your stereo.

Now that CD-R is ready for prime time, how do you choose a drive? We examined 11 CD-R drives—each based on one of four 2× mechanisms or a Yamaha CDR100 4× mechanism—to find out. We recorded Mac (HFS), cross-platform (ISO 9660), and audio (CD-DA) discs and explored the software in depth. The 2× mechanisms performed virtually identically, writing at about half the speed of the 4×-based drives. The × refers to the rotating speed of a standard audio CD player and the data-transfer rate of a CD-ROM drive at that speed: 150 kilobytes per second. A 2× drive, for example, transfers data at 300 KBps.

All the hardware we tested performed reliably, so it's really the software that determines whether your sessions will be delights or disasters. Fortunately, most vendors bundle the best available, so you can easily avoid the rest and base your buying decision on the bottom line.

Hot Numbers

Mass-produced CDs are made in mastering facilities, where a glass master disc is prepared from a premastering source (usually a tape or hard disk), and metal stamper plates are created from the glass master. The CDs are then replicated in large, expensive machines called stampers, which are designed for volume production and require skilled operators.

By contrast, desktop CD production must be optimized for limited runs and end-user operation, yet effectively mimic stamped CDs. A CD-R drive uses a dual-intensity laser to write, or "burn," data; it turns up the heat to activate a photosensitive dye in the CD-R media, burning the data into the disc. The dye is permanent, and so is your data. That's great . . . as long as you successfully write the correct data. Human and mechanical errors are also permanent, so before recording, careful preparation of your source, or premastering, is essential. Before you begin that, though, you need to be sure all your hardware is up to the task.

The Speed of Light

To figure out the kind of hardware you need for CD-R, you have to do some math. Blank CDs are rated in terms of maximum data-storage capacity and audio playing time; a traditional CD holds either 650MB of data or 74 minutes of music. A 2× drive will burn a CD in about 40 minutes, while a 4× drive will take about 20 minutes.

If you haven't got a top-of-the-line CPU, relax—

you don't need a powerhouse Power Mac to support CD-R. An entry-level 040 machine can handle the job. The important number is your disk drive's sustained SCSI transfer rate. Most SCSI drives transfer data at least as fast as 1.2MB per second, and that's double what CD-R drives need. A 2× CD-R drive writes at a sustained speed of 300 KBps, while a 4× drive writes at 600 KBps.

Sustained hard disk performance is critical because CD-R requires a continuous flow of data. CD-R uses a RAM buffer to regulate that flow. If your source disk can't keep pace with the CD-R drive, you get a condition called *buffer underrun:* the buffer empties and the data flow is interrupted, rendering the disc useless. The amount of built-in RAM makes a measurable but insignificant difference (see the benchmark, "As the Laser Burns"), because in write mode that RAM serves only as a buffer, not as a cache to speed access to data. Thus, rotational speed is what counts.

Beware of drives that perform thermal recalibration, though, as such recalibration interrupts data flow. It's best to use AV (audiovisual) drives, which are designed for sustained transfers. Also, you'll probably want to optimize the source drive with a defragmentation utility, such as AlSoft's (713/353-4090) DiskExpress II or Symantec's (541/984-2490; *http://www.symantec.com*) Norton Speed Disk, so that file fragmentation doesn't introduce long seek times that cut down on read performance.

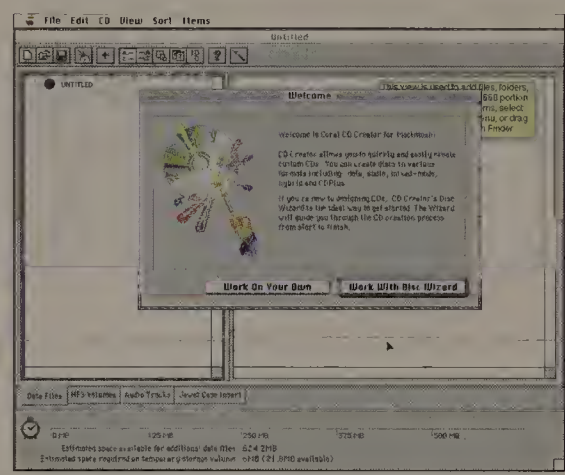
If your hard drive can't keep up, you can always downshift the write speed of the CD-R drive. However, the need for continuous data flow means you can't use your Mac for anything else while burning a disc, so you want a speedy CD-R drive and a hard drive fast enough to feed data to it. If you'll be burning a lot of CDs, consider dedicating a Mac to the task.

Premastering Software

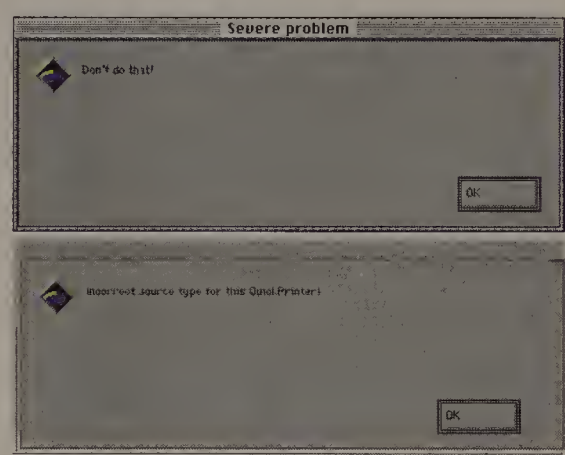
With the same engines under most of the CD-R drives' hoods, it's the premastering software that defines your experience in the driver's seat.

Currently, Astarte's (612/483-5388, *http://www.astarte.de/*) Toast CD-ROM Pro dominates the market, and it's easy to see why. (Bundled with 9 of the 11 drives we tested, it also sells separately.) While it's short some bells and whistles, Toast's interface is clean, functional, and easy to use, and the program gets the job done with minimal problems and interaction. Toast handles HFS, ISO 9660, HFS/ISO hybrid, audio, CD-i, and other CD-ROM formats; can simulate a write operation without burning a disc to make sure the system will perform properly; and can verify the CD against the source. The manual is brief but clear and thorough.

Pops Up Easily Astarte's Toast is one of the few CD-R packages that lets you build System 6 files and create bootable Apple CD-ROMs. In addition, it's straightforward, streamlined, and efficient. Our sneak peeks at the upcoming version 3.0 indicate it's just as good.



Off to See the Wizard Corel CD Creator's Disc Wizard is wonderfully easy to work with—except when it comes to Mac-only HFS discs. *Sigh.* But with more guidance online than any other program, this is the yellow brick road to take if you're just starting out.



So What's the Problem? If you double-click on a QuickTopix image file in order to launch the CD-R program, you get the cryptic message "Don't do that!" Moving the window reveals an equally mysterious error message. Hello?

Toast makes creating HFS CD-ROMs especially simple. Just load a disc, select HFS from the CD-ROM menu, press the Data button to choose a source volume, click on Write CD, and let it burn (see the screen shot "Pops Up Easily"). You can write an entire disc in a "disc at once" session, or record a "track at once" session and append more data to the disc later. Multisession recording, as the latter is called, is perfect for such uses as creating incremental backups, although it's impractical for small backups because each session adds 13MB of overhead to the disk. You can also choose whether to add a System 6 Desktop file or make the CD-ROM bootable in an Apple CD-ROM drive (the latter option is a Toast exclusive), and whether to omit from the final disc blank space at the end of the source volume. This last option saves mastering time by not "burning" empty sectors.

Need to burn a disc for Macs, PCs, and Unix machines? Toast also makes short work of mastering for the cross-platform ISO 9660 format. Select any single source volume or folder, and Toast creates an image file—a virtual volume made up of your selected files, from which Toast then writes the disc. Toast automatically converts HFS folders to equivalent ISO 9660 directories. You can use standard ISO file naming—all caps, with underlines instead of spaces—or use DOS or Macintosh file names if you don't need Unix compatibility.

Toast 2.5.9, current as of this writing, doesn't give you much direct control over the ISO 9660 image file or the layout—the design interface for creating and organizing an image file or disc. You can't choose multiple source folders for a single image, nor can you edit a saved image file. Instead, you must do all configuration in the Finder beforehand, creating aliases that Toast then uses to build the image file. You can prioritize the files to reduce seeks and boost performance, but the feature is limited and awkward. By the time you read this, however, these and other shortcomings will have been addressed in Toast CD-ROM Pro 3.0.

Toast CD-ROM Pro can create audio CDs, too. Just select the AIFF or Sound Designer II sound files you want, drag them into the order you prefer, and burn. Making mixed-mode CDs—disks that

contain both audio and data—is just as easy. To grab audio from prerecorded CDs and perform more sophisticated audio CD premastering—such as generating the subcodes necessary for pressing a professional audio CD—you also need other utilities, such as Astarte's Toast CD-DA (list price $499).

Toast's competitors are ambitious in design but mostly fall short in execution. Corel's (613/728-8200, *http://www.corel.com*) CD Creator, bundled with the Philips CDD2000, has its strengths (it's also available separately for $179). The Corel Disc Wizard takes you step-by-step through the burning of a CD, or you can work on your own (see the screen shot "Off to See the Wizard"). Selecting source volumes and directories is a breeze. You can edit ISO layouts extensively within CD Creator, assigning file priorities to enhance performance. You can extract audio from a CD, convert between a variety of sound file formats for sound editing, and launch your choice of third-party sound editors from within CD Creator. There's even a minimal graphics module for designing the booklet that slips inside the CD jewel case.

KEVIN CANDLAND

For the Record Of the 11 CD-R drives we tested, both DynaTek Automation Systems' CDM400 (top) and Direct Connections' DCDR-100 (bottom) use Yamaha's CDR100 mechanism and boast high speed, low prices, and excellent software.

On the downside, CD Creator supports only HFS, ISO 9660, CD-DA, and mixed-mode formats. (We're shocked to see Philips ship software that doesn't support its own CD-i format.) CD Creator can't write HFS image files, yet always copies blank space from HFS volumes, so you must use a separate utility to create a partition for each job. Finally, the labyrinthine array of dialog boxes presents countless paths to the same few places. CD Creator is great for creating ISO 9660 and simple audio CDs, but little else.

Elektroson's (408/371-4800, *http://www.elektroson.com*) Gear, bundled with the Microboards PlayWrite 2000, is far less usable (it's available separately for $299). You can't build HFS or audio CDs automatically as you can with Toast; you must build an image file, which is time- and space-consuming. You also can't add audio files to a CD-DA image file in a batch mode; you must add each one manually.

When building an ISO 9660 image file with Gear, you can't access the desktop to select an entire volume, nor is there a Select All command to add multiple items (though you can shift-click to do so). You have to set a maximum number of directories, too. Set too low a number, and you must OK an alert for each item over the limit—Abort doesn't work. Gear

The Right Recordables

Company	Product	Star Rating [A]	List Price/ Company's Estimated Price [B]	Phone	Mechanism	Warranty (in years)	Mastering Software
APS Technologies	APS CDR 2×4	★★★/6.9	$900/$900	816/483-6100	Sony CDU-920S	1	Astarte Toast
Direct Connections	Editors' Choice DCDR-100	★★★★/7.2	$1195/$1195	612/937-6283	Yamaha CDR100	1	Astarte Toast
DynaTek Automation Systems	CDM240	★★★/6.8	$999/$899	902/832-3000	Yamaha CDR102	1	Astarte Toast
	Editors' Choice CDM400	★★★★/7.2	$1199/$1099	902/832-3000	Yamaha CDR100	1	Astarte Toast
FWB	HammerCD-R 2×	★★★/6.2	$1400/NP	415/325-4392	Sony CDU-920S	1	Astarte Toast
Microboards	PlayWrite 2000	★★/4.4	$1195/$1195	612/470-1848	Sony CDU-920S	1	Elektroson Gear
MicroNet Technology	Master CD Plus	★★★/5.6	$1195/$1095	714/453-6100	Ricoh RO1060C [C]	2	Astarte Toast; Optical Media International Disc-To-Disk
	Master CD Pro	★★★/6.6	$1895/$1795	714/453-6100	Yamaha CDR100	2	Astarte Toast; Optical Media International Disc-To-Disk
Optima Technology	DisKovery 650CDR	★★/4.9	$1395/$1275	714/476-0515	Sony CDU-920S [D]	1	Optical Media International QuickTopix and Disc-To-Disk or Astarte Toast
Philips Electronics	CDD2000	★★★/6.4	$1035/$849	408/453-5129	Philips CDD2000	2	Corel CD Creator
Smart and Friendly	CD-R 1002	★★★/6.5	NP/$899	818/772-8001	Sony CDU-920S	1	Astarte Toast

NP = Not provided. [A] Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for explanation.) [B] Actual prices could be higher or lower than the estimated street price provided by the company. [C] According to MicroNet, the Master CD Plus will be changed to a Ricoh RO1520C 4× read, 2× write mechanism with expandable RAM cache by press time. [D] Firmware reengineered by Optima Technology.

MW LAB

As the Laser Burns

When Macworld Lab tested 11 CD-R drives for speed, we discovered that the rotational speed directly reflects the speed at which the drive performs. The amount of RAM cache—important in avoiding buffer underruns (that is, when the flow of data stops, ruining the disk)—affected performance only slightly. The key to safe CD-R operation is to make sure the transfer rate of the hard drive mechanism used for mastering exceeds the speed of the CD-R mechanism.

Times are in seconds; shorter bars are better.

Drive (Mechanism)	Speed	RAM Cache	363MB Hard Drive	300MB MPEG Video
DynaTek CDM400 (Y100)	4×	512K	862	803
Direct Connections DCDR-100 (Y100)	4×	512K	862	802
MicroNet Master CD Pro (Y100)	4×	512K	861	800
DynaTek CDM240 (Y102)	2×*	512K	1688	1573
APS CDR 2× (S)	2×4	1024K	1658	1541
MicroNet Master CD Plus (Rc)	2×	512K	1728	1614
FWB HammerCD-R 2× (S)	2×	1024K	1655	1539
Microboards PlayWrite 2000 (S)	2×	1024K	1659	1539
Optima DisKovery 650CDR (S)	2×	1024K	1656	1538
Smart and Friendly CD-R 1002 (S)	2×	1024K	1656	1537
Philips CDD2000 (P)	2×	1024K	1659	1532

*2× write speed, 4× read speed.

Mechanism Key: P = Philips CDD2000; Rc = Ricoh RO1060C; S = Sony CDU-920S; Y100 = Yamaha CDR100; Y102 = Yamaha CDR102.

Behind Our Tests

During testing, we burned two CDs with each drive. One CD was burned with more than 8500 files of varying sizes and types totaling 363MB from a typical hard drive, in order to evaluate the CD-R drive's capabilities as an archival device. The other CD was burned with a 300MB QuickTime movie, in order to evaluate the CD-R drive's capabilities in a multimedia environment. After creating each CD, we ran a verification test to confirm that data was recorded properly. **—Macworld Lab testing supervised by Matt Clark and Mark Hurlow**

was also the only program we tested that failed with a buffer underrun.

Worse is Optical Media International's (408/376-3511, *http://www.microtest.com*) QuickTopix, which comes with the Optima DisKovery 650CDR. QuickTopix, which is available separately at a list price of $395, sports a baffling interface, made even more so by hopelessly overwritten documentation. It couldn't detect blank media on insertion, requiring us to quit and relaunch the program to burn a CD. It also crashed routinely with error messages from the cryptic to the bizarrely prosaic (see the screen shot "So What's the Problem?"). Fortunately, Optima offers Toast as an alternative.

Optima also bundles its own CD-R Access, which takes a novel approach to CD-R. CD-R Access is a control panel that treats blank CD-R discs like floppies: you can format and mount them in the Finder, and write to the discs simply by dragging icons. CD-R Access supports multisession recording transparently—you can even change or delete entries at any time. It doesn't get much easier.

Still, CD-R Access has limitations, albeit with ingenious workarounds. First, it writes only HFS discs. However, Optima XChange (list price $59)—a complete read-only HFS-access utility for all flavors of Windows—is available in a free demo version that fully supports CD-R Access discs, so you've got limited cross-platform support even without ISO 9660.

Second, a CD-R Access Reader control panel must be installed for these discs to mount on a Mac, unlike discs made with other software that mount with standard CD-ROM drivers. Fortunately, Optima makes distribution painless: just insert a CD-R Access–formatted disc in any Mac with QuickTime installed, and an installer launches, giving you the option to install CD-R Access Reader and restart. Reader is also posted on Optima's BBS (714/476-0626). So, while it's not an all-purpose program, CD-R Access is solid supplemental software, and all that some users will ever need.

The Last Word

Software aside, what's our recommendation for hardware? At these prices, there's little reason not to choose a 4× drive. Both the Direct Connections DCDR-100 and the DynaTek (*http://raider.dynatek.ca*) CDM400 bundle Toast CD-ROM Pro and, at under $1200, are priced just $200 to $300 over the cheapest 2× drives. We like DynaTek's lower price, lifetime free tech support, and extra power outlet, though we prefer Direct Connections' metal case to DynaTek's plastic one. The MicroNet Master CD Pro's longer warranty and additional software simply don't justify its exorbitant $1895 price tag (*http://www.micronet.com*).

Until they get significantly cheaper—and they will by year's end—2× drives make more sense for hobbyists or those on tight budgets. The APS CDR 2×4 (*http://www.apstech.com*), Smart and Friendly CD-R 1002, and DynaTek CDM240 all run under $1000 and include Toast. Smart and Friendly cuts corners a hair too sharply with a cheap SCSI cable and passive terminator, but the other two are fine choices. We don't consider the DynaTek's 4× read speed much of an edge, as we wouldn't wear out a pricey CD-R mechanism reading discs when we'd get better performance from a relatively cheap CD-ROM drive (which most users already have).

We like the Toast-equipped version of Optima's DisKovery 650CDR, and the solid construction and robust software bundle of FWB's HammerCD-R 2× (*http://www.fwb.com*), but not at list prices up to $500 over those of other 2× drives. If deep discounts bring the premiums for these packages down to the street value of their bundles, then we'd seriously consider them.

The right CD-R drive can send your limitations in the area of data distribution up in smoke and let you rewrite the rules of how you archive data. Add in the combination of good software and a compelling price, and these drives become a hot addition to your desktop. m

PETER M STOLLER (*afcpeters@aol.com*) is a consultant to America Online's Macintosh Operating Systems forum.

CD RECORDERS

Macworld Lab looked at 11 desktop CD recorders, comparing software, recording speed, and burn for the buck.

★★★★/7.2 **DCDR-100** This 4× CD-R drive came with our favorite premastering software and costs only a little more than drives with half the speed. **Company:** Direct Connections (612/937-6283). **List price:** $1195.

★★★★/7.2 **CDM400** It boasts the lowest estimated street price of the 4× CD-R drives in our survey, with no sacrifices in software, features, or performance. **Company:** DynaTek Automation Systems (902/832-3000, *http://raider.dynatek.ca*). **List price:** $1199.

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$"8F86 A9BC 2057 2050"
$"4868 0002 A8F6 4E75"
}; "

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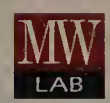
Massive Storage Needs Require Giant Drives

The Optima DisKovery 4100W (left), APS 4.0 (top), and MicroNet SB-8640.

HUGE HARD DRIVES

MACWORLD LAB TESTS THE BIGGEST (AND BEST-PRICED) HARD DRIVES YET



BY BRETT GLASS

RUNNING OUT OF STORAGE ON YOUR file server, digital-video workstation, audio-recording and -editing system, or Web server? Take heart. The behemoths are here. All the hot new hard drives featured in this review pack 3.9GB to 8.4GB of data into a standard 3.5-inch or 5.25-inch package. (Manufacturers bill the largest drives as 9GB, but drives reach this mark only if one ignores the space taken up by formatting.) • To put this achievement in perspective, a mere three and a half years ago the least expensive 500MB drive cost about $1100. The drives reviewed here offer approximately 8 to 16 times the storage in the same space, starting at about the same price or less. • In this comparison, Macworld Lab tested the external drives using mechanisms from Micropolis, Quantum, and Seagate. While not all big-gig drives are created equal, a number offer some of the fastest performances on the storage market while still cutting the cost per gigabyte to unprecedented lows (see the table, "Fast Facts on Giant Drives"). As you check out our test results, you'll be able to weigh these factors and pick the drive that best suits your requirements.

We also looked at some bare mechanisms direct from Hewlett-Packard, IBM, and Seagate; we did not rate these, but you may want to check for good values among the top-performing units (such as Seagate's Ultra SCSI ST32155N in our standard tests, and Hewlett-Packard's C5455A in our accelerated tests) in the ads at the back of this magazine. The other products come in complete, ready-to-run bundles that include power supplies, enclosures, cables, terminators, and driver software.

Our tests confirmed what we anticipated: when you're shopping for a drive, it's not enough to look for a pretty package. It's vital to know who made the mechanism inside, as well as who made the driver software. And if the bundle includes a SCSI accelerator card, that can give performance a big boost.

The Need for Speed . . . and Space This is the first question you need to ask when picking a drive: Is your main priority speed or size? Of the applications that typically require lots of space, such as multimedia, still-image processing, and the Internet, some require fast drives, while others just need the space.

Still Images One of the most popular Mac applications, still-image processing doesn't involve constant data transfer but requires a fast drive nonetheless. Why? Because the files that hold high-resolution, 24-bit images are *big*, even if they're stored in a compressed format like GIF. If they're slow to load, say good-bye to high productivity. And if you back up your work every several minutes—always a prudent move—a slow drive may become a source of constant frustration.

We therefore included a test that measures how fast a drive can retrieve and save a large Adobe Photoshop image; note the performance improvement gained by using a SCSI accelerator card. For top performance from a big drive, an accelerator is worth the extra few hundred dollars (see the sidebar, "Add-on Cards Take You to the Next Level").

OTOGRAPHS BY KEVIN CANDLAND

Digital Audio and Video As all multimedia producers soon learn, huge drives are essential for the massive files used in multimedia and AV production. These applications require steady, uninterrupted data transfers that can last for minutes, rather than blisteringly fast data flow—though "the faster, the better" is usually a good rule of thumb in AV. Also, the drive may need to make a sudden, brief trip to another portion of the disk and return quickly, so random access times (measured by our ACI US 4D database-search test; see the benchmark "Biggest Doesn't Always Mean Fastest") are important as well.

Because of their need for speed, many AV professionals look to RAID (Redundant Array of Inexpensive Disks). RAID can offer ultimate speed and data security—for a price (see "The RAID Option," *Macworld*, April 1995).

Web-Server Drives If you're looking for a drive for your Web server, speed is not that critical. A typical commercial Internet connection, a T1 line, can carry only 1.5 million bits per second, and even the slowest drive in this comparison supplies data more than ten times that fast. Nor do you need speed if your system is only storing and forwarding E-mail, since mail isn't a real-time operation.

A few Internet applications, however, do require speedy storage. Usenet newsgroups, for example, are a high-pressure information firehose. If you operate a news server, even the fastest drives may have trouble keeping up. The 4D search test in this comparison is a good indicator of a drive's fitness for this task; by this measure, the Quantum XP34300-series mechanisms, offered by CMS Enhancements, La Cie, and MegaHaus, stood out.

Other High-Capacity Contenders The ProMax PR2.4207WP (left) and the MegaHaus MC1991.

What Makes a Drive Fast?

Our tests showed that certain drive specifications greatly affect overall performance. All hard disk drives find information by moving an *armature* and *read/write head*—similar to the tone arm and needle on an old-fashioned record player—inward and outward over the disk to find the track that holds the required data. The time it takes the head to reach its new position is called the *seek time*.

But once the head gets to the right position, it must wait until the required data rotates underneath it. This waiting period, *rotational latency*, is shorter if the drive spins faster. Rotational latency is not as critical during long, sustained data transfers, such as large–still-image transfers or digital-video work, as the drive does not have to seek out data as frequently during these operations.

Our tests bore out this principle. The slowest 4GB mechanism, a Seagate ST15230N (in ClubMac's C104 0354), spins at only 5400 revolutions per minute. In contrast, the Seagate ST15150W, a similar mechanism (in the MicroNet SSW-4100 drive and the FWB PocketHammer 4100FMF-W), rotates at 7200 rpm and is considerably faster.

Another factor that can make a big difference is the amount of data per *cylinder*—the amount of data the drive can access without moving its read/write heads. Because the drive's heads read more data from a large cylinder without having to move to a new position, the drive has to seek less frequently.

Thus, within any group of drives of the same capacity, the ones with more platters tend to be faster. So do the ones with higher recording densities—that is, the drives that write more data onto each circular track on the disk. When comparing the specs of drives with the same capacity, you can easily recognize the one with the greatest capacity per cylinder: the drive that sports the greatest number of platters and the fewest cylinders.

Since all the drives in this comparison push the limits of data density, cylinder density isn't a major differentiating factor. But if you're considering a model not listed in our chart, find out how many platters it has. Expect slower performance from drives with fewer than ten.

One factor that didn't seem to matter as much was the amount of built-in cache memory on the drive. A drive's cache is used for two purposes. First, it allows the drive to read ahead—that is, to retrieve the block of data immediately following each one the computer requests. Since computers often read blocks of data in sequence, this means the data the computer is most likely to want next will already be in the cache when the computer asks for it. Second, a cache can also hold the contents of frequently accessed blocks of data so they need not be read each time they're needed.

Why didn't on-drive cache size affect results? Because the Mac OS itself maintains a disk cache in your computer's main memory. (The size is changeable, but you can't turn it off.) Thus, you won't notice a difference between a drive with, say, 256K of cache and one with 512K of cache except under extreme conditions—for example, when playing multiple QuickTime movies or the drive is kept constantly busy with random accesses.

On the other hand, you probably will be able to speed up disk throughput by adding more memory to your Mac and devoting some or all of the new RAM to the disk cache. On a large drive especially, this extra cache can save the head a time-consuming trip to the drive's volume table of contents, which the system must consult to find data on the disk.

Fast, Wide, Ultra, or AV?

Another performance factor is the type of SCSI interface the drive uses. The first thing you should know is that *every* SCSI drive made today has at least a Fast SCSI-2 interface (which means that the drive can deliver data at 10MB per second). So don't assume that the word *Fast* means faster than other models.

Fast/Wide SCSI—68 pins on the SCSI connector, rather than the usual 50—can transfer data up to 20 MBps, or twice as fast as traditional SCSI. Of course, this is theoretical capacity; the drive and computer may not be fast enough to take advantage of it. This is probably why the Seagate ST15150N mechanism (used in Liberty Systems' 704.2GB), with only Fast SCSI, performed a shade better on the native Mac bus than the Seagate ST15150W, the Fast/Wide version of the same drive (used in FWB's PocketHammer 4100FMF-W and MicroNet's SSW-4100). However, with a SCSI accelerator

ADD-ON CARDS TAKE YOU TO THE NEXT LEVEL

To get the most out of your investment in a large-capacity hard drive, pair it with a PCI SCSI adapter (frequently referred to as a SCSI accelerator). We found that the drives' performance improved significantly in nearly all cases when we tested them with an Adaptec Fast/Wide 2940W PCI SCSI card ($349; 408/945-8600, *http://www.adaptec.com*).

Moreover, improvement was not consistent with earlier rankings. The 9GB Seagate ST410800 series, which came in dead last on the Mac external SCSI bus, moved up to the middle of the pack with the Adaptec card. The Hewlett-Packard C5455A mechanism went from near the bottom to the top spot. (The C5455A was not offered by any vendor in this roundup, but check the ads in the back of the magazine for purchase options.) The moral: if you're looking for top performance from a big drive, it's worth the extra few hundred dollars to get a SCSI accelerator.

The Seagate ST32155N, an Ultra SCSI mechanism, showed little improvement with the Adaptec card, because it's a narrow drive; a forthcoming wide version of an Ultra drive should show significant improvement when paired with a SCSI adapter.

Some vendors say they optimize performance by bundling drives with their own device driver and SCSI adapter card. We tested such a combination from MicroNet (results not shown) and found that it did indeed perform about 10 percent faster than the same drive using the Adaptec card and FWB driver.

If you decide to go with a SCSI accelerator, be sure to check out all your options. Many vendors of packaged drives will throw in an accelerator at a discounted price. Some accelerators have built-in provisions for RAID; others offer various combinations of Fast, Wide, and Ultra SCSI interfaces. For a look at accelerator-card options from QLogic, Atto, FWB, and Western Digital (see "First Add-ons for the New PCI Macs," *News, Macworld*, September 1995).

MW LAB

SCSI Accelerators: How Big a Boost?

Best result in test. Mechanisms are listed from fasted to slowest. All times are in seconds. Shorter bars are better.

Mechanism	Capacity	Overall Performance Ranking*	4D Search	Open Photoshop File	Save Photoshop File	Copy to Drive	Copy from Drive	Duplicate 40MB File
Hewlett-Packard C5455A	8334MB	1.00	193.4	24.1	21.0	13.0	13.9	12.0
Seagate ST15150W	4096MB	0.90	189.7	26.4	24.8	12.7	16.3	15.3
IBM DFHSS4F	4304MB	0.89	207.0	27.8	23.1	14.4	15.7	13.9
Quantum XP34300W	4101MB	0.87	183.6	27.8	29.0	15.3	15.7	14.2
Quantum XP34300	4101MB	0.86	179.3	28.4	28.5	15.4	16.1	14.5
Seagate ST15150N	4096MB	0.85	191.9	28.9	25.2	14.4	17.1	16.5
Seagate ST410800W	8670MB	0.85	232.2	30.2	25.5	12.6	16.9	15.2
Seagate ST410800N	8670MB	0.82	231.8	30.0	25.6	14.4	17.1	15.4
Seagate ST14207N	4096MB	0.82	218.0	28.5	27.0	15.4	16.4	16.1
Micropolis 1991-27	8670MB	0.82	283.7	29.0	24.6	14.3	15.0	16.4
Micropolis 3243-19 (AV)	4096MB	0.81	265.0	28.9	26.1	14.3	15.1	17.7
Seagate ST14207W	4096MB	0.80	294.0	27.8	26.1	15.8	15.8	15.9
Micropolis 3243-19	4096MB	0.80	277.2	31.5	27.3	14.5	15.3	16.2
Seagate ST15230N	4095MB	0.77	201.4	33.5	32.9	16.3	16.7	17.9
Seagate ST32155N**	2050MB	0.74	210.3	33.7	35.4	16.5	16.7	20.4

** This ranks overall performance compared with the fastest mechanism (which has a ranking of 1.00). **2GB Ultra SCSI mechanism.*

Behind Our Tests

Macworld Lab tested high-performance hard drives with an Adaptec Fast/Wide 2940 PCI SCSI card, using our standard suite of business and graphics applications. To show access speed, we ran an unindexed search of a 96,775-record ACI US 4th Dimension database. For an indication of data throughput, we opened and saved a 40MB file in Adobe Photoshop. To determine general performance, we duplicated a 40MB file in the Finder, as well as copied the file to and from each test unit. Tests were conducted using a Power Macintosh 7500/100 with 32MB of RAM, running System 7.5.3 and using a Quantum Empire 1080S external hard drive.—**Macworld Lab testing supervised by Jeff Sacilotto**

card, the Fast/Wide units outperformed the narrow SCSI models.

Ultra SCSI, a new technology, theoretically can double the speed yet again; an Ultra/Wide SCSI bus can transfer at 40 MBps. We tested an Ultra SCSI mechanism, the 2GB Seagate ST32155N, and it finished at the top; but because it was an Ultra/Narrow drive, it didn't improve in testing with a SCSI accelerator card.

AV drives are a key tool for audiovisual and other media professionals. AV drives aren't *intended* to offer a faster average speed; instead, they provide a smoother flow of data. This is vital for digital video and audio, where gaps in the data stream can lead to dropped video frames and embarrassing sound glitches.

AV drives provide better continuity in two ways. First, their internal caches are tuned to read farther ahead, guaranteeing that data is ready long before it's needed. Second, AV drives can postpone an operation known as *thermal recalibration*. During a thermal recalibration, the drive interrupts what it's doing and literally measures the size of its platters, adjusting for expansion and contraction due to heat and cold. Unfortunately, these measurements can take up to half a second, and if they're done while a multimedia program is running, they cause frames to be dropped. An AV drive is designed to sense a long, continuous data transfer and put off recalibrations until later.

You might expect that one would pay for AV capabilities by sacrificing performance in other areas. The AV version of the 4GB Micropolis mechanism in DynaTek's HDA4.0MVD-M1 lost some ground in the tests involving continuous read, write, and copy operations. But the drive blew its non-AV cousin away on the 4D search test, finishing 10 seconds faster. Thus, its final performance rating was only slightly below that of the non-AV model, used in the APS 4.0 drive. This supports manufacturers' claims that you can buy an AV drive without worrying that its performance will suffer in non-AV applications. Given the choice between similar drives, multimedia developers should pick the AV version.

Verify Your Mechanism Buying a drive can be frustrating, given that vendors switch mechanisms at will depending on wholesale pricing and availability. Two identical boxes on the same shelf might hold different mechanisms with different speeds. So ask the dealer to open the case and tell you what brand of mechanism lies inside. Or if there's a sticker on the box claiming that the warranty will be voided if you open the case, connect the unit to a Mac and use a SCSI-bus–analysis utility to read the make and model number electronically. (Apple System Profiler, available free from Apple, 408/996-1010, *http://www.apple.com*; or Now Software's Now Utilities, 503/274-2800, *http://www.nowsoft.com*, both do the job.)

Driver Training

Once you've selected a hard drive for your computer, your selection is complete, right? Wrong. Our tests show quite clearly that it's not just the drive that governs performance: formatting software also matters. Several third-party formatters—APS PowerTools 4.0.1, CharisMac v2.54h1, FWB Hard Disk ToolKit 1.8, La

FAST FACTS ON GIANT DRIVES

Company	Product	Star Rating [A]	List Price/Company's Estimated Price [B]	Cost per Megabyte [C]	Mechanism	Formatted Capacity	Phone
APS	APS 9.0	★★★/5.0	$2200/$2200	$0.26	Micropolis 1991-27	8400MB	816/483-1600
	APS 4.0	★★★/6.0	$1100/$1100	$0.28	Micropolis 3243-19	3900MB	816/483-1600
ClubMac	C104 0354	★★/4.6	$1019/$1019	$0.26	Seagate ST15230N	3900MB	714/768-8130
CMS Enhancements	Platinum PL4.0G	★★★/5.2	$1499/$1079	$0.28	Seagate ST14207N	3900MB	714/517-0915
	Platinum PL4.0G-W	★★/4.6	$1550/$1129	$0.29	Quantum XP34300W	3900MB	714/517-0915
DynaTek	HDA4.0MVD-M1	★★★/5.5	$999/$899	$0.23	Micropolis 3243-19 (AV)	3900MB	902/832-3000
FWB	Hammer 8700FMF	★★/4.9	$3449/$2999	$0.36	Seagate ST410800N	8400MB	415/474-8055
	PocketHammer 4100FMF-W	★★★/5.2	$2569/$2190	$0.56	Seagate ST15150W	3900MB	415/474-8055
La Cie	La Cie Quantum Atlas	★★★/5.1	$969/$969	$0.24	Quantum XP34300	4000MB	800/999-0143
Liberty Systems	704.2G8	★★/4.8	$1799/$1799	$0.46	Seagate ST15150N	3900MB	408/983-1127
MegaHaus	MC1991	★★★/5.4	$2399/$1999	$0.24	Micropolis 1991-27	8400MB	713/534-3919
	Atlas QM34300	★★/4.9	$1299/$1059	$0.27	Quantum XP34300	4000MB	713/534-3919
MicroNet	SB-8640	★★★/5.4	$3380/$2750	$0.33	Micropolis 1991-27	8400MB	714/453-6000
	SSW-4100	★★★/5.3	$2320/$2050	$0.53	Seagate ST15150W	3900MB	714/453-6000
Microtech International	Blue 4000	★★/4.6	$1820/$1390	$0.36	Seagate ST14207N	3900MB	203/468-6223
Optima Technology	DisKovery 4100W	★★★/5.9	$1565/$1425	$0.36	Quantum XP34301 [D]	4000MB	714/476-0515
ProDirect	PD4207S	★★★/5.0	$1050/$850	$0.22	Seagate ST14207N	3900MB	612/941-1805
	PDST9000W	★★/4.8	$2085/$1925	$0.23	Seagate ST410800W	8400MB	612/941-1805
ProMax	PR2.4207WP	★★★/5.5	$1995/$1795	$0.46	Seagate ST14207W	3900MB	714/727-3977

[A] *Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See* Star Ratings *section for full explanation.)* [B] *Actual prices could be higher or lower than the estimated street*

Cie Silverlining 6.5/25, MicroNet Utility 7.0.5, and OnTrack DiskManager Mac 4.02c—ran neck and neck in our tests. But DynaTek's Compass Pro 3.2 dragged every unit we tested down to the bottom of the chart. (If you buy a DynaTek drive, toss the formatter and purchase another.)

Also, version 7.5.3 of the Mac OS had a significant speed advantage over 7.5.2. Whichever drive you pick, make sure you complement it with the latest OS version.

Packaging Prowess

When you buy your drive, you'll have a choice of getting a "bare" mechanism or buying a prepackaged drive that plugs into an external SCSI port. Buying just the mechanism will save you the cost of an external case and power supply; it also expands product options. On the other hand, an external drive is easier to move from one system to another and provides plug-and-play convenience.

Case Options Among the external drives, there were many differences in packaging, most of them cosmetic. About half the companies that submitted external drives for this comparison economized by using generic cases with the company logo pasted on.

At the other extreme was Microtech International's Blue 4000 drive, which came in an elaborate case that boasts a snazzy LCD display and push-button controls on the front panel. Except for the locking connectors that let you stack drives, however, the case was more sizzle than substance. When we attempted to use the front panel to set the drive's SCSI ID number, it conflicted with a mechanical ID-selection switch on the back panel. And when we selected Help from the display's menu, the display merely scrolled Microtech's 800 number—through which I was unable to reach a tech-support person even after multiple calls.

In only two instances did the packaging actually impress us. When we opened the MicroNet SSW-4100's solid metal case, we found that MicroNet had used a rubber caulklike compound to seal connectors in place so that they would not come loose during shipping. And the ProMax PR2.4207WP's case, designed for RAID systems, let us slide drives in and out with little effort.

On the whole, though, a fancy-looking external case aims to make nearly identical products *look* unique. So base your buying decision on price, performance, and the warranty.

Terms of Termination One important packaging issue to watch for when buying an external SCSI hard drive is the type of terminator supplied. Active termination tends to cause fewer problems—especially if you've got long cables or are using Ultra SCSI—than passive termination. (Among tested products, only those from ClubMac and MegaHaus offer passive termination.) Even better is switchable active termination (which replaces the terminator with a convenient switch), built into the drive case in both APS models, as well as in those from La Cie and Liberty Systems, and in the ProDirect PD4207S.

Noise Factors Steve Jobs, father of the Macintosh, despised the noise made

FREE FALL IN STORAGE COSTS

Adjusted for inflation and shown in 1996 dollars.

Since 1992, prices have dropped an astounding 93 percent per megabyte for the largest drives on the Mac market. Plummeting storage costs have also pushed the trend toward bigger and bigger file sizes, however, especially for visual media. This means you need more and more capacity to keep pace. Still, if the industry keeps this up, it'll soon be giving away gigabyte drives as party favors.

Warranty (in years)	SCSI Wide/ SCSI Adapter Included	Comments
5	no/no	A fast drive at an average price; power-supply fan was extremely noisy.
5	no/no	Very fast drive, decently priced.
5	no/no	Not much of a bargain for one of the slowest of the big drives.
5	no/no	An above-average performer with active termination, but as a narrow drive it will never serve highest performance needs.
5	yes/no	A little pricey for average performance.
5	no/no	Very fast, economical, AV-ready unit, but replace the bundled software driver (the slowest we tested).
5	no/yes	Slow, pricey drive; we expect better from FWB.
5	yes/yes	Too steep a price for a just-above-average performer.
5	no/no	An average performer for an average price.
1	no/no	Far too costly for a just-above-average performer with a one-year warranty.
5	no/no	A fast drive for a reasonable price, but its passive termination can be a headache.
5	no/no	An average performer for an average price; suffers from a passive terminator.
3	no/yes	A top performer among the big drives, but why only a three-year warranty?
3	yes/yes	Solid, rugged packaging but only average performance.
5	no/no	Pricey, above-average performer offers a stackable case, but its unique LCD front panel failed to operate properly.
1	yes/yes	Shipped with Xchange, a Mac-to-PC file utility; beware the short warranty.
5	no/no	A good value for an above-average performer with externally switchable active termination, but this narrow drive won't serve highest performance needs.
5	yes/no	Eminently affordable, but sluggish performance.
2	yes/yes	Boasts a clever case with an extra bay, similar to those used for RAID systems, so an additional drive is a good value; accelerated performance fails to impress.

price provided by the company. [C] *Based on company's estimated street price.* [D] *Based on the Quantum XP34300.*

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Biggest Doesn't Always Mean Fastest

The overall best performer was the relatively small 2GB Seagate Ultra SCSI mechanism, the first in what will be a profusion of products built around that new technology. This was one of several examples showing that drive size was not a clear indicator for speed. The figures below reflect testing with formatters bundled by the vendors. To see if formatters make any difference, however, we retested a sampling of drives with seven leading formatters, from FWB, APS, La Cie, MicroNet, OnTrack, CharisMac, and DynaTek. Performance was consistent no matter which formatter was used—with the exception of the DynaTek Compass Pro 3.2 formatter; drives formatted with that package performed substantially more slowly than the same drives formatted with competing software.

Best result in test. Mechanisms are listed from fasted to slowest. All mechanisms tested with the external SCSI port. All times are in seconds. Shorter bars are better.

Mechanism	Capacity	Overall Performance Ranking*	4D Search	Open Photo-shop File	Save Photo-shop File	Copy to Drive	Copy from Drive	Duplicate 40MB File
Seagate ST32155N **	2050M8	1.00	205.8	36.2	35.3	17.5	18.0	19.6
Micropolis 3243-19	4096MB	1.00	270.1	36.9	28.4	17.9	18.2	18.5
Micropolis 3243-19 (AV)	4096MB	0.96	260.0	37.4	30.9	18.5	18.3	20.3
Micropolis 1991-27	8670MB	0.96	280.4	36.4	30.4	18.3	20.3	19.1
Seagate ST14207N	4096M8	0.94	215.2	41.6	34.4	17.4	19.8	21.3
Seagate ST15150N	4096MB	0.91	191.6	41.4	33.6	20.6	20.9	24.0
Seagate ST14207W	4096MB	0.91	283.9	41.9	32.4	17.9	20.1	20.8
Quantum XP34300W	4101MB	0.91	179.1	43.9	35.6	20.5	20.8	23.4
Quantum XP34300	4101M8	0.90	178.4	43.7	36.3	20.6	21.4	23.6
Seagate ST15150W	4096MB	0.90	189.3	41.9	34.9	20.6	21.4	24.0
IBM DFHSS4F	4304MB	0.90	202.2	43.7	33.1	20.0	21.0	23.9
Hewlett-Packard C5455A	8334M8	0.88	190.4	45.5	33.9	21.3	22.0	24.5
Seagate ST15230N	4095M8	0.87	199.6	45.1	38.4	20.6	21.4	24.3
Seagate ST410800W	8670MB	0.87	237.1	41.7	35.0	21.1	21.2	24.3
Seagate ST410800N	8670MB	0.84	234.7	46.8	37.3	21.0	21.5	24.3

** This ranks overall performance compared with the fastest mechanism (which has a ranking of 1.00). ** Ultra SCSI mechanism.*

Behind Our Tests

Macworld Lab tested high-performance hard drives using our standard suite of business and graphics applications. To show access speed, we ran an unindexed search of a 96,775-record ACI US 4th Dimension database. For an indication of data throughput, we opened and saved a 40MB file in Adobe Photoshop. To determine general performance, we duplicated a 40MB file in the Finder, as well as copied the file to and from each test unit. Tests were conducted using a Power Macintosh 7500/100 with 32MB of RAM, running System 7.5.3 and using a Quantum Empire 1080S external hard drive.—**Macworld Lab testing supervised by Jeff Sacilotto**

by cooling fans and for years insisted that Macs not include them. Even now, the noisiest Mac may still be quieter than the cooling fan of a large disk drive. Only one unit—the APS 9.0—seemed excessively loud in the lab. But because noise annoyance can be highly subjective, try to audition a drive away from noisy sales floors to make sure it won't prove, well, insanely grating.

The Last Word

How to make your choice? First, pick the mechanism you want based on speed and your capacity needs. If you're doing AV work, go with an AV-rated drive; the Micropolis 3243-19 (AV version) mechanism used in the DynaTek HDA 4.0MVD-M1 appears to be a good one for general use as well as for digital AV.

If you are concerned about performance and are not using a SCSI accelerator card, stay away from units containing the 9GB Seagate 410800, such as the FWB Hammer 8700FMF and the ProDirect PDST9000W. Units with this mechanism came in dead last in our tests unless we added a SCSI accelerator.

Once you've picked the innards, look at street prices and warranties. As you compare prices, remember to factor in the cost of a SCSI accelerator, if one is included. A bundle that includes a card should cost about $300 more than one without. (If it carries a higher premium, you may want to get the card separately.) For the best deal of all, consider asking a computer store or drive retailer with aggressive hard-drive prices to install a drive (and possibly an accelerator card) internally, saving you the price of the case.

What about warranties? A five-year warranty is becoming the standard in the world of large hard drives, and only a few vendors (Liberty Systems, MicroNet, Optima, and ProMax) offered less. Because hard drives fail most often in the third to fifth years of service, get the full five years unless you're brave, cutting costs to the bone, or buying with a credit card that extends the warranty.

Whatever drive you select, though, you should enjoy that satisfaction of truly massive storage capacity at an impressively low price. **m**

Author, electrical engineer, and software designer BRETT GLASS lives in Laramie, Wyoming. One of the first Mac programmers, he coauthored Living Videotext's *ThinkTank for the Mac and PC*. He can be reached via E-mail at *brett_glass@infoworld.com*.

4GB TO 9GB HARD DRIVES

MW EDITORS' CHOICE

Editors' Choice: None

Hard drives are a commodity product, and opportunities to add value while keeping the price constant are sorely limited. A few of the products in this review stood out in minor ways, but you won't notice a performance difference between products using the same mechanism. Therefore, price shopping is key, and as prices shift regularly, check carefully before you buy.

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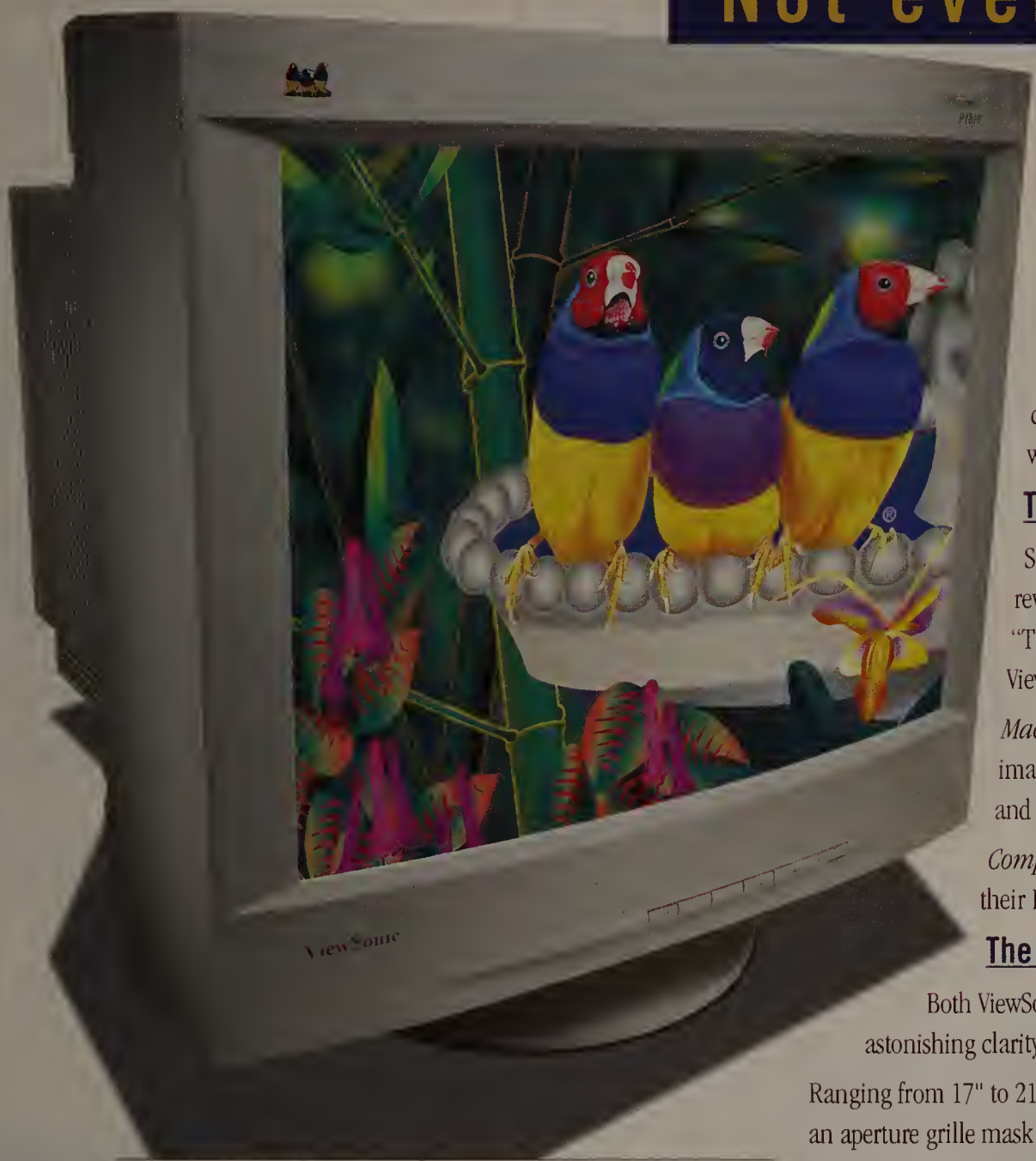

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Computer Reseller News gave the SonicTron PT770 their Editor's Choice award in April, 1996.

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CRT Size	21"	20"	17"	17"
Viewable	20.0"	19.1"	16.0"	16.0"
Horizontal Scan Rate	30-96 KHz	30-85 KHz	24-82 KHz	30-65 KHz
Maximum MAC® Resolution	1600x1200	1280x1024	1280x1024	1024x768
Color Control	Yes	Yes	Yes	No
CRT Warranty	3 Years	2 Years	3 Years	2 Years
MSRP*	$1,895	$2,299	$895	$1,099

* MSRP as of August 1, 1996. Prices and specifications subject to change without notice.

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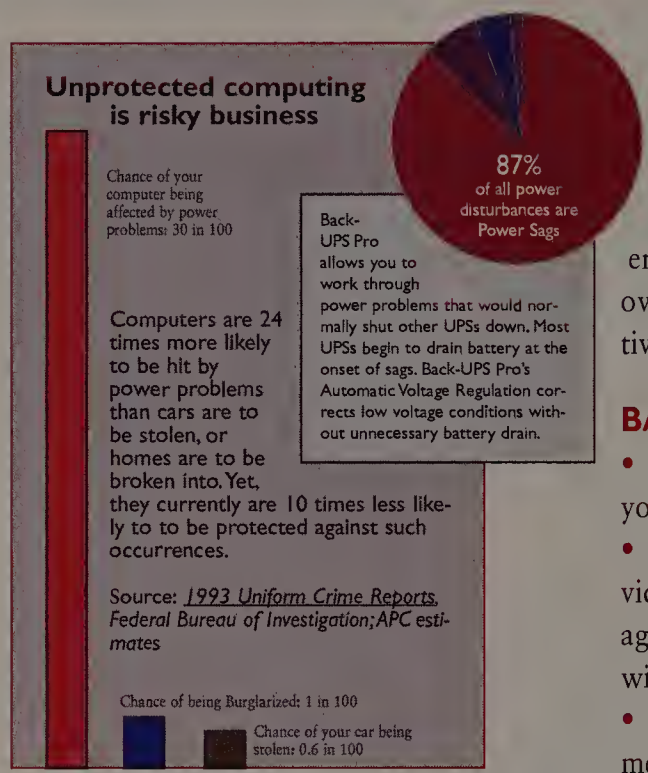

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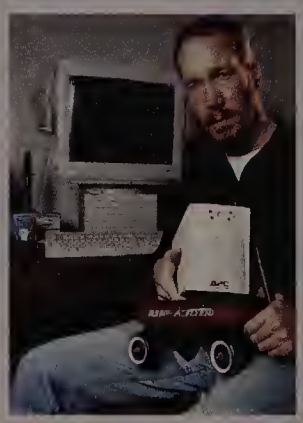

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CLOCKWISE: "After 13 plus years in the computer industry (with both Apple and Digital), I have changed directions and now live in the Santa Cruz mountains, where the power is as bad as the view is beautiful," says Harald Striepe. "Now I spend most of my time consulting and writing fictian. The power is the worst during roiny seasan and brownouts are a daily occurrence. But, not a problem for me since I got my Back-UPS Pro with AVR - now, I work through the rainstorms."

"I am the Product Development manager for Rodio Flyer," says Antonio Pasin. "But quite often, I work at home, where I pay for all the equipment....my TV has been zapped in the past (it turned GREEN!). Here, I don't have an extra $1200 to reploce the DAT tape backup...an investment in APC is more cost effective for me. But besides just protecting the hordware, I look it it as protecting my media...I hove lots of time invested in my dato, and Back-UPS Pro protects that as well. Not to mention the unit is well-designed, easy to use, and APC provides great customer service to boat."

"I am a grophic designer/illustrator, using mostly 9500/132 and B100/80 PowerMacs, in centrol Florida, the lightning capital of the world," said Thomas Sessions of Sessions Design in Orlando. "We lose power on a weekly basis ond have constant outages....I've used APC for at least 8 years, but Back-UPS Pro is my current favorite - it hos a smaller footprint and I can plug in my modem. Before UPSs, when we heord a thunderstorm, you would just hurry and try to get the work done, then just shut down- unplug the machines ond take o break.....now I wouldn't work without one....particulorly in this deadline oriented industry."

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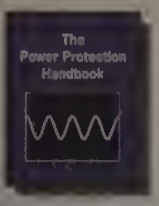

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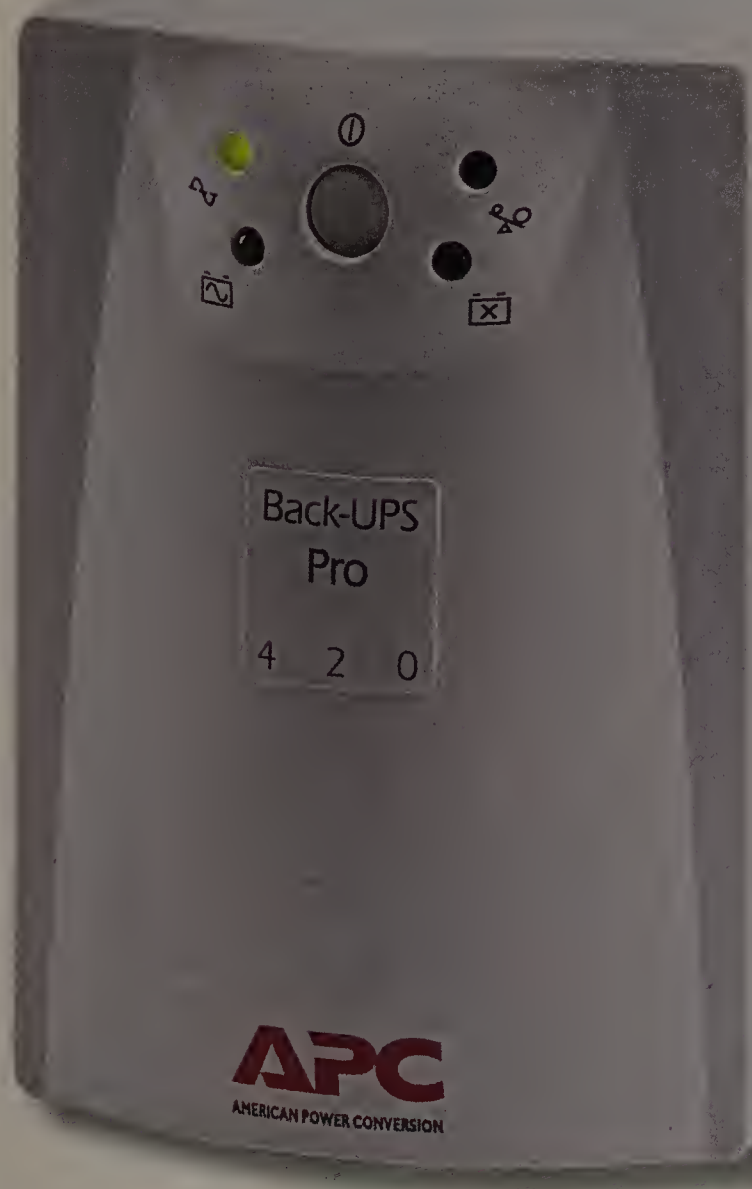

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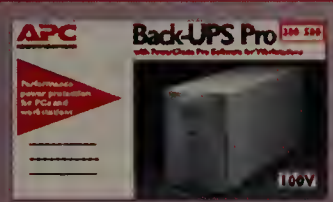

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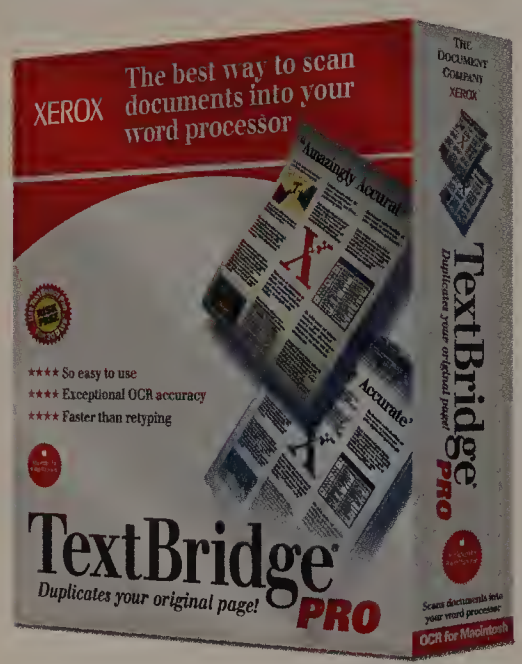

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Secrets

The Art of Juggling Extensions

HOW THE HUMBLE EXTENSIONS MANAGER CAN ENHANCE YOUR LIFE

by Joseph Schorr

Good news: Apple is distributing a free program that can speed up your Mac, provide more RAM to all your applications, and reduce system crashes and extension conflicts. No, it's not System 7.5 Update 3.0 or a prerelease component of Mac OS 8 (Copland)—or anything else nearly that exotic. I'm actually referring to a familiar part of System 7.5.X—the Extensions Manager control panel.

Granted, there isn't much to Extensions Manager; it does little more than provide a convenient way to turn extensions and control panels on or off. But by using it to turn on only the start-up files you really need, you can reap all the benefits described above. For example, you can reduce the amount of RAM System 7.5.3 requires—to a surprisingly tiny 1.5MB—by turning off all but the essential extensions and control panels your Mac needs to run. Follow these tips to tap into Extensions Manager's features.

Set 'Em Up

Actually, Extensions Manager does more than toggle extensions and control panels on and off; it lets you define *sets* of extensions you can then turn on and off en masse. Defining useful sets is the key to unlocking Extension Manager's real power. Once you've done this, it's easy to shift between system configurations optimized for the types of work you do.

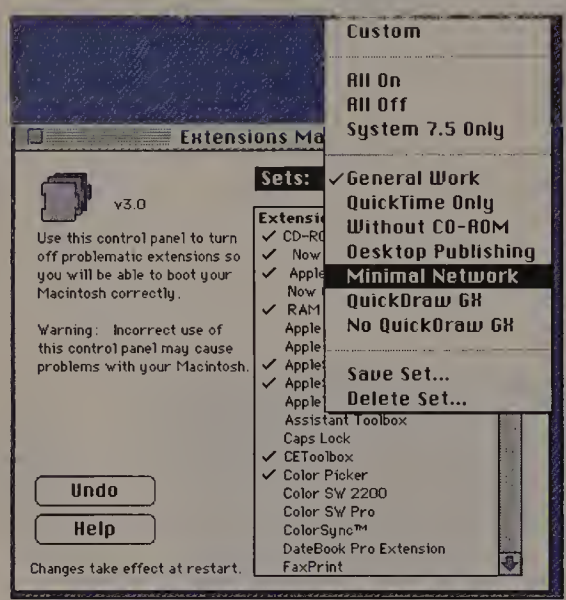
To create a new set, open the Extensions Manager control panel and select the control panels and extensions you want to activate by clicking on their names in the scrolling list. Activated files have a check mark next to them; files without check marks are turned off. When you've turned on all the files you want to include in your custom set, choose Save Set from the Sets pop-up menu and give the set a name. (If you want to save your current configuration, open Extensions Manager and use the Save Set command *before* clicking on any files. Then you can freely turn other files on or off to make new sets and return to your original configuration at any time.)

The idea is to create sets that activate specific combinations of start-up files you need for particular tasks. In "Start-up Strategies," for example, you can see the sets I've created for myself. The QuickTime Only set turns off all extensions except those needed to run QuickTime, so I can maximize my available RAM when editing video. The Without CD-ROM set turns off the Foreign File Access extensions, freeing up another 444K. The QuickDraw GX set lets me turn on the RAM-gobbling QuickDraw GX when I absolutely need it. The Minimal Network set enables only those extensions required to log on to the

continues

Internet. (For more on which files you may not need, see *Secrets*, July 1996.)

Extensions Manager comes with a few ready-to-use sets installed—All On, All Off, and System 7.5.X Only. This last set is particularly valuable. If you encounter extension conflicts or other problems after installing third-party software, switch to the System 7.5.X set in Extensions Manager and restart. Extensions Manager activates only those files that were a part of the original system software installation—a real aid in troubleshooting. You can't automatically revert to the standard installation with third-party extension-manager programs, such as Casady & Greene's Conflict Catcher and Now Startup Manager.



Start-up Strategies To switch from one configuration to the next, you just open the Extensions Manager control panel, change the setting in the Sets pop-up menu, and restart. You can also open Extensions Manager automatically when you start your Mac by holding down the spacebar during start-up.

When Extensions Manager Goes Berserk

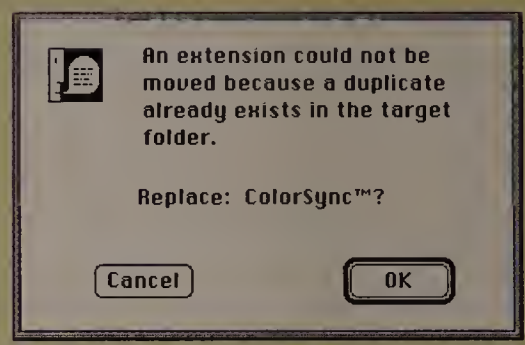
Extensions Manager does its job of turning extensions on and off by shuffling files in and out of the Control Panels and Extensions folders; moving the files to folders named Control Panels (Disabled) and Extensions (Disabled) turns them off. Unfortunately, Extensions Manager sometimes gets confused about which files are in each folder. This can happen after you've performed a system software upgrade that dumps new control panels and extensions into the System Folder or after you've manually moved files out of the aforementioned folders.

Extensions Manager manifests its confusion in a dialog box when you try to turn a file on or off (see "Befuddled Extensions Manager"). Another telltale sign is when duplicate file names appear in the scrolling list in the Extensions Manager window. Follow these steps to reset a fouled-up Extensions Manager control panel.

1 Manually drag all the control panels and extensions out of their respective folders and into the corresponding (Disabled) folders. Leave Extensions Manager itself in the Control Panels folder. If the Mac warns you that some items are already in the Disabled folders, click on OK to replace them with the files you're moving.

2 Drag the Extensions Manager Prefs file (located in the Preferences folder in the System Folder) into the Trash.

3 Restart. When you launch Extensions Manager, the scrolling list shows all the files as disabled. Now you can start fresh, turning on only those you want to activate.



Befuddled Extensions Manager Once Extensions Manager loses track of where files are, it can't enable or disable them properly.

TWO IMPORTANT POINTS: First, remember that some files don't show up in the Extensions Manager window—files such as Network Extension and the QuickDraw GX printer driver. You have to drag those files back into the Extensions folder to reactivate them after you've performed these steps. Second, trashing the Extensions Manager Prefs file obliterates any sets you've created with Extensions Manager. Keep a record of your set configurations elsewhere.

What about the Shift Key?

When you choose the All Off set and restart, Extensions Manager turns off all your control panels and extensions. But, you ask, why should I go to all that trouble when I could just as easily restart my Mac while holding down the shift key—doesn't that turn off all extensions too?

The answer is, yes—and no. Though we commonly say both methods turn off "all" extensions, the two are not exactly the same. Extensions Manager can turn off printer drivers, which the shift-key method doesn't affect. If you start up with the All Off set, you can't print. A shift-key start-up leaves your printer drivers intact.

On the other hand, starting up with the shift key down turns off files that Extensions Manager doesn't handle, such as System Update files. (The only way to tell which files these are is to compare the files displayed in the Extensions Manager window with the actual files in the Extensions folder. Files not in the Extensions Manager window fall into this category.) According to Apple, the more "esoteric" extensions have been filtered out of Extensions Manager on the assumption that you won't want to mess with them. If you want to enable or disable the Clipping Extension or Network Extension, for example, you can't get to it through Extensions Manager. You have to open the Extensions folder and manually drag such items to the Extensions (Disabled) folder to deactivate them.

The bottom line is, starting your Mac with the shift key held down always eats up less RAM than starting with the All Off set. When you need to eke out every last bit of available RAM in your system, bypass Extensions Manager and hold down the shift key. m

Contributing editor JOSEPH SCHORR is coauthor of *Macworld Mac and Power Mac Secrets*, third edition (IDG Books Worldwide, 1996).

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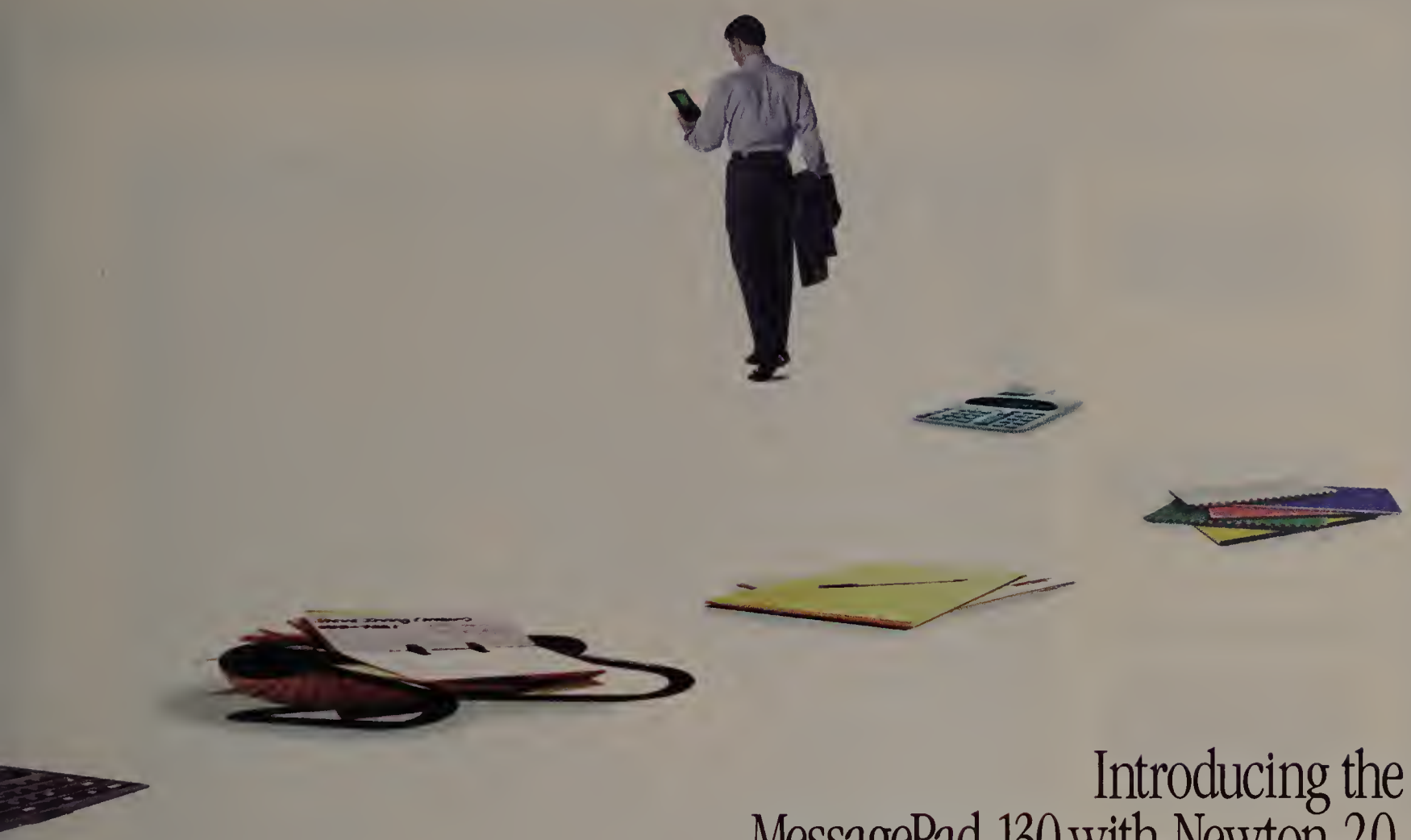

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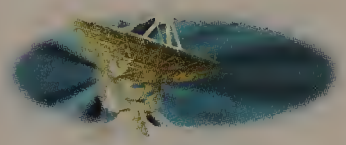

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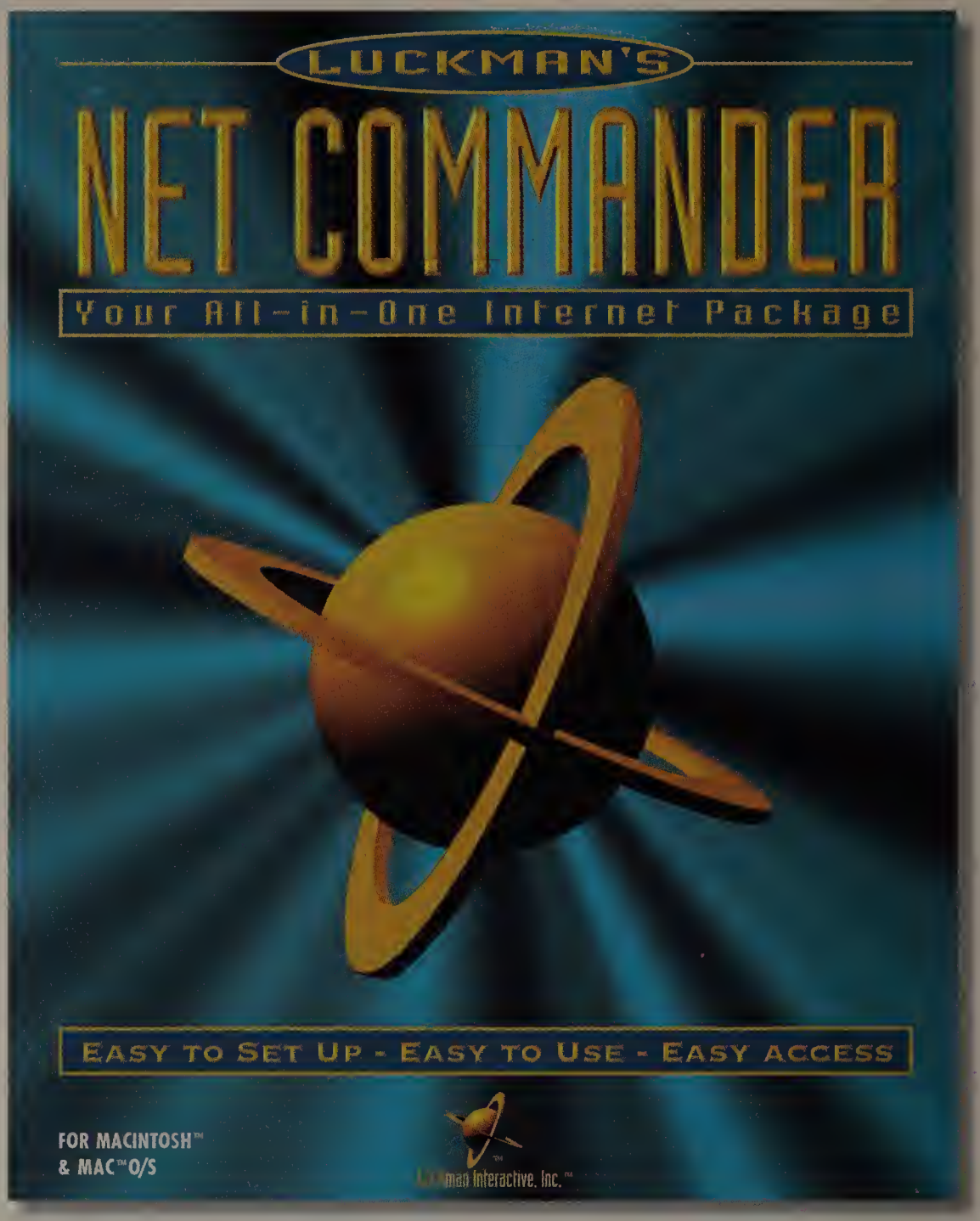

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Circle 65 on reader service card

Quick Tips

Tips, Tricks, and Shortcuts

by Lon Poole

PageMill 1.0 (Adobe Systems, 415/961-4400, *http://www.adobe.com*; $149) is good for designing Web pages with images and text, but it does not support all the HTML tags available in Netscape Navigator 2.0. You can add these tags manually as raw HTML, but problems may ensue. Robert Berkman of Brooklyn has identified a problem with and a solution for creating frames, which place individual Web pages as panes within the main browser window. The problem occurs when you add the tag **<frameset rows="50%,50%">** to a Web page in PageMill and save the page. When you or your cyberspace audience attempt to view the page in a browser that supports frames, such as Netscape 2.0, the bar separating the two frames does not appear. The problem also occurs if you use PageMill to open a downloaded Web page containing frames, make some minor modifications, and then save it in PageMill. This happens because when PageMill saves a Web page, it automatically inserts body tags at the beginning and end of the page's HTML source. This disables frames in the page since frameset tags have to come *before* body tags.

To correct this pane-in-the-page problem, either open the document with another HTML editor, or open it with a browser and show the source with SimpleText. Look for the **<body>** tag at the beginning of the document (you'll find it just after the **<html>** tag) and move it to *after* the frameset tags you've created. If you're working in SimpleText, use the Save As command to make sure your changes are saved. Then inspect the corrected document with your browser. Result: frames galore!

Deleting a Damaged Font

Q I somehow damaged my font suitcase (don't ask me how!) and now I am unable to delete it from the computer. How do I get rid of it? Can I fix it?

TINA WONG
Calgary, Alberta, Canada

A It's easier to start fresh with a new Fonts folder than to try to fix a damaged font suitcase. Try dragging the Fonts folder from the System Folder to the desktop. Then open the Fonts folder and drag the damaged suitcase to the Trash. Empty the Trash, and put the Fonts folder back in your System Folder. If you can't drag the damaged suitcase to the Trash, try this: with your original Fonts folder still sitting on the desktop, create a new folder named Fonts inside the System Folder. Drag everything except the damaged suitcase from the old Fonts folder (on the desktop) to the new Fonts folder. Restart the computer and drag the old Fonts folder, still containing the damaged suitcase, to the Trash.

File-Sharing Basics

Q I would like to connect a Performa 400 with a Performa 637CDV to transfer files between them. Can I somehow connect the computers using Apple's LocalTalk software? Preferably, I would like to mount one computer's hard drives so that it appears to be an external hard drive on the other computer's desktop. What is the procedure, and what hardware do I need? How would I transfer files?

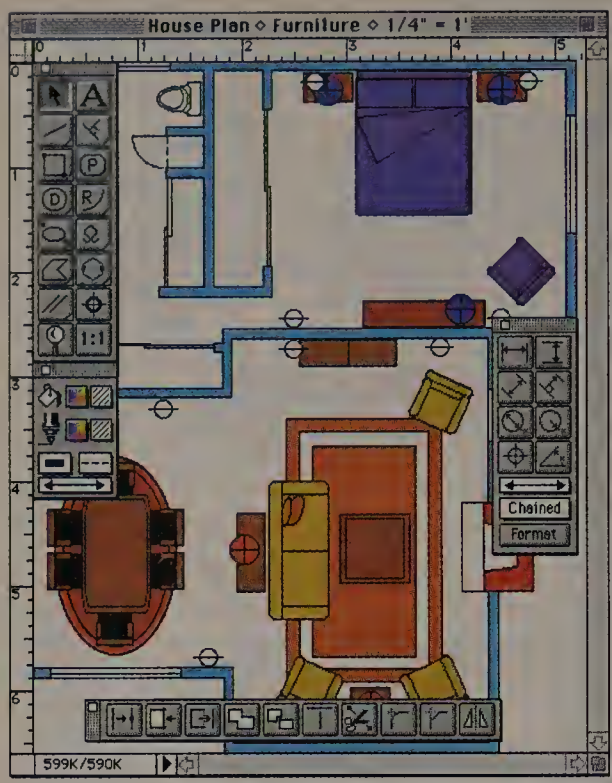
THOMAS J. MARCY
Eden Prairie, Minnesota

A First you must connect your Macs and your printer in a local area network (LAN). Then you can share files and access shared printers with standard System 7 commands, control panels, and the Chooser. The most economical type of network, and one all Macs and network printers can connect to, is a LocalTalk network. "Do-It-Yourself Network" illustrates what it takes to build a simple LocalTalk network.

Some Macs and printers can use Ethernet connector boxes and wiring to establish an EtherTalk network. Ethernet parts cost more than PhoneNet parts, but an EtherTalk network lets more people use the network concurrently without bogging down and is faster than a LocalTalk network.

You'll find information on using System 7's file sharing in System 7.5.3's Macintosh Guide online help in the Sharing Files topic area. (Access Macintosh Guide from the Guide menu while in the Finder.) Shameless plug: There's a chapter on file sharing in my book *Macworld System 7.5 Bible*, third edition.

continues



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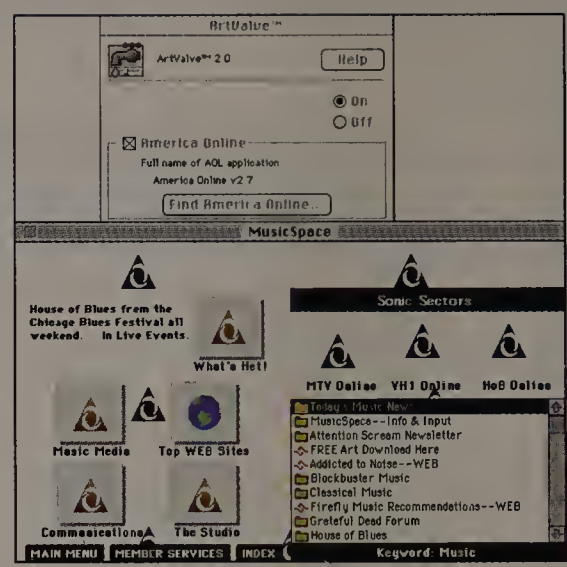
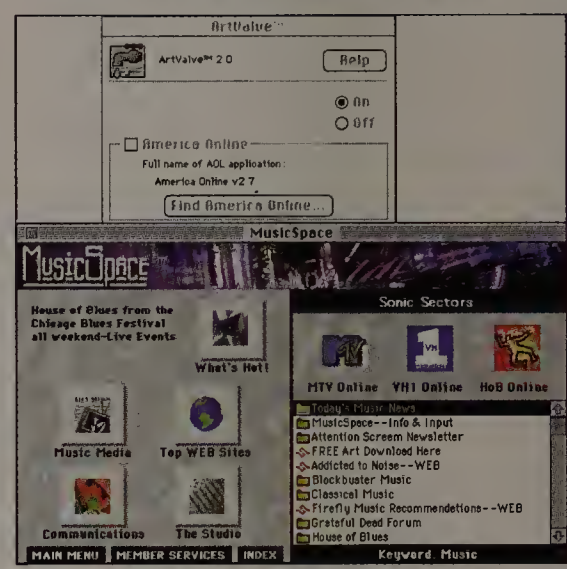
Block AOL Artwork

Q Do you know of any way to stop America Online from downloading artwork? I dislike waiting during this process.

STEVE SELF
Durango, Colorado

A The ArtValve 2.0 control panel ($5 shareware by Bill Karsh) lets you block and unblock the downloading of AOL artwork. ArtValve requires version 2.5 or later of the AOL software.





Art Block ArtValve can stop AOL from downloading artwork. You see a generic graphic in place of the blocked artwork (top), and you can get art you previously blocked without disconnecting from AOL.

Scripting FileMaker 3.0 Find Requests

TIP In Claris FileMaker 3.0, you can use the Set Field script step to specify criteria for a scripted find request. However, a Set Field step can only set a field to a value that matches the field's type (number, text, date, and so on). To illustrate this drawback, suppose you created the following script to find all invoices that are more than 30 days past due:

Enter Find Mode []
Set Field ["Past Due", ">30"]
Perform Find []

In this example, the Set Field step ignores the > symbol and simply places **30** into the Past Due field. The result is a script that finds only invoices that are exactly 30 days past due.

To include operators in a field of a scripted find request, use a Paste Literal step instead of a Set Field step. The following script illustrates:

Enter Find Mode []
Paste Literal ["Past Due", ">30"]
Perform Find []

If you want your script to set a field to the result of a calculation, use a Past Result step. The following script finds invoices with due dates 30 days or more prior to the current date, which is provided by the FileMaker function Today:

Enter Find Mode []
Paste Literal ["Payment Due", "≤"]
Paste Result ["Payment Due", "Today – 30"]
Perform Find []

There are a couple of rules to keep in mind when building a script using Paste Literal, Paste Result, or any other type of Paste step. If you want a Paste step to add to the end of a field's contents—not replace the contents—you must deselect the Select Entire Contents option for that step. Also, the field specified in a Paste step must be included in the active layout. If you don't want users to be able to see the field, choose a transparent fill and line pattern for it, and choose a text color that matches the layout's background.

SUSAN DOYLE
Rapid City, South Dakota

Viewing HTML Source

TIP Netscape Navigator 2.0 probably launches a word processor to show you the HTML source of a Web page when you choose Document Source from the View menu. Since Netscape knows more about HTML than most word processors, you may want to have it show you the source itself. Just choose General Preferences from the Options menu, click the Applications folder tab, and turn on the Use Netscape option.

Netscape colorizes tags nicely, making HTML source codes easier to read.

continues

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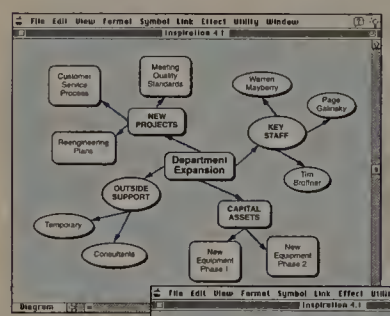

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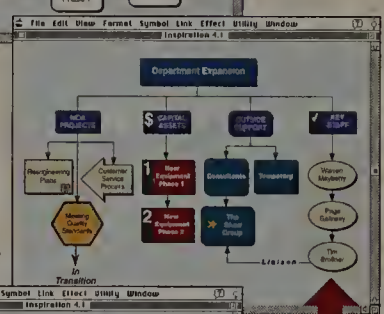

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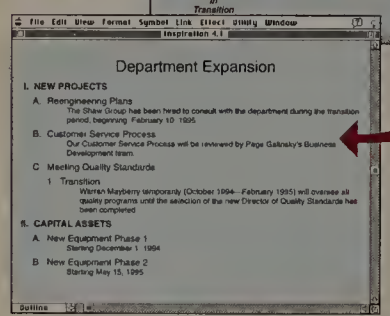

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It also takes less time than bringing up another application to view the source.

If a Web page has errors, Netscape also indicates likely problems. For instance, I forgot to end a tag in my page, thus leaving other tags embedded inside this tag. Netscape displayed the embedded tags in a different font than other tags. This showed me instantly where the problem tag was located. Similarly, some tags were flashing when I forgot to put in end-quotation marks. These debugging features are very useful.

HOWARD RAFAL
Cambridge, Massachusetts

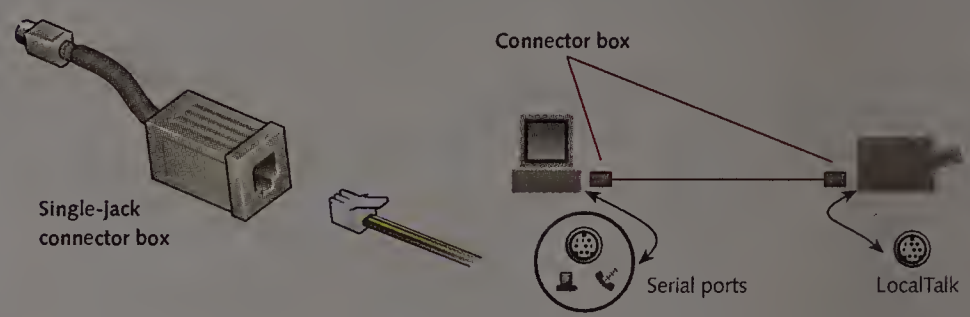
Quick Bits

• Although you can drag an URL from Claris Emailer to Netscape Navigator 2.0 (as described in *Quick Tips*, July 1996), there's a more direct way to access a Web site, as John Eckman of Seattle points out. Emailer has a hot-links feature that you enable by installing Internet Config (freeware by Peter Lewis and Quinn), the de facto standard software for coordinating Internet applications and specifying Internet preferences. You use Internet Config to identify your Web browser,

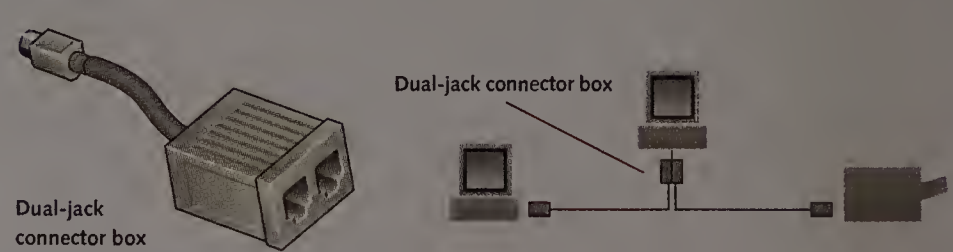
continues

Do-It-Yourself Network

It's easy to establish a LocalTalk network: simply plug a *network connector box* into the *printer port* of your Mac and plug a second connector box into the printer port of another Mac. To network your Mac to a printer, network modem, or other networkable peripheral, plug the second connector box into the printer's or modem's *LocalTalk port.* You link the two connector boxes with ordinary telephone cord, the kind used to connect a telephone to a wall socket. Be sure to use four-wire telephone cord, not two-wire (look for four colored wires showing through the clear RJ-11 modular plugs).



If your home or business uses four-wire telephone cord, you can extend your network from room to room using the existing telephone cords and jacks in the wall. With the four-wire cord, for example, the network connector box is factory-set to use the yellow and black wires (the telephone is factory-set to use the red and green wires). Farallon Computing's (510/814-5000, *http://www.farallon.com*) PhoneNet Pocket Connector, a $12.99 single-jack network connector box, works well for two-device networks. Farallon also sells a PhoneNet Starter Pack—two Pocket Connectors and a telephone cord—for $19.99. To establish a network between, say, several Macs and a printer, you'll need *dual-jack connector boxes,* such as the $29.99 PhoneNet, also from Farallon Computing (older Macs and peripherals use DB-9 PhoneNet connectors, which cost $36.99). For best network performance and reliability, be sure to plug the terminator that comes with each dual-jack network connector into the connector's unused jack.



Later you can expand your network by daisy-chaining connector boxes. If you have any single-jack connector boxes, put them at either end of the chain and fill the middle with dual-jack connector boxes.

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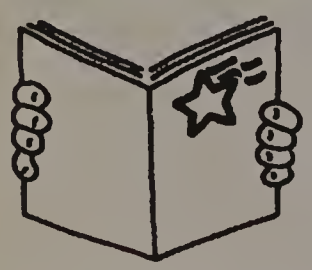

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• The correct method for opening Extensions Manager during start-up is to hold down the spacebar. Holding down the shift key, the method mentioned in July's *Quick Tips*, disables all extensions.

• If you want to insert graphics in a SimpleText document, there's a simpler way than using ResEdit (as described in May's *Quick Tips*). Ean White of Boston recommends using text processor TexEdit Plus ($10 shareware by Tom Bender). You can use it to copy from a read-only SimpleText document, create a read-only or editable SimpleText document, or save a text document in other formats.

• Turning fonts on and off automatically as you open and quit applications seems to Ryan La Riviere of Philadelphia more like a job for Suitcase 3.0 (Symantec, 408/253-9600, *http://www.symantec.com*; $70) than System 7.5's AppleScript (see May's *Quick Tips*). Suitcase 3.0 costs extra but provides a simpler, more complete solution for font management. A competing product, MasterJuggler 2.0 (Alsoft, 713/353-4090; $69.95), can also turn fonts on and off as you open and quit applications. See the review of both products, elsewhere in this issue.

All shareware and freeware mentioned this month is available from Macworld Online (*http://www.macworld.com/*; on America Online, keyword *Macworld*). m

We pay $25 to $100 for tips published here. Send questions or tips on how to use Macs, peripherals, or software (by mail or electronically) to *Quick Tips*, Lon Poole, at the address listed in *How to Contact Macworld* at the front of the magazine (include your address and phone number). All published submissions become the property of *Macworld*. Due to the high volume of mail received, we're unable to provide personal responses.

LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld System 7.5 Bible*, third edition (IDG Books Worldwide, 1994).

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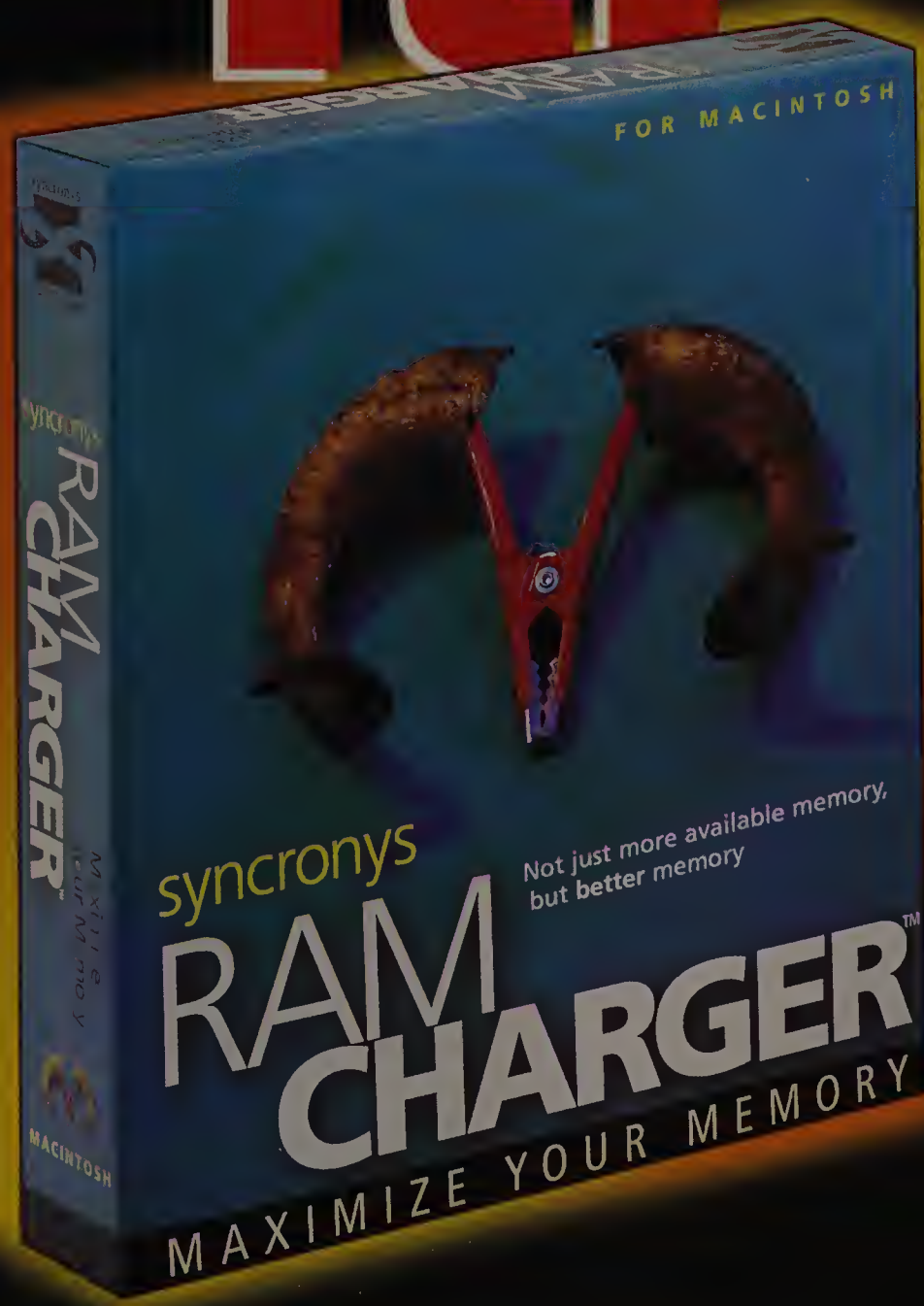

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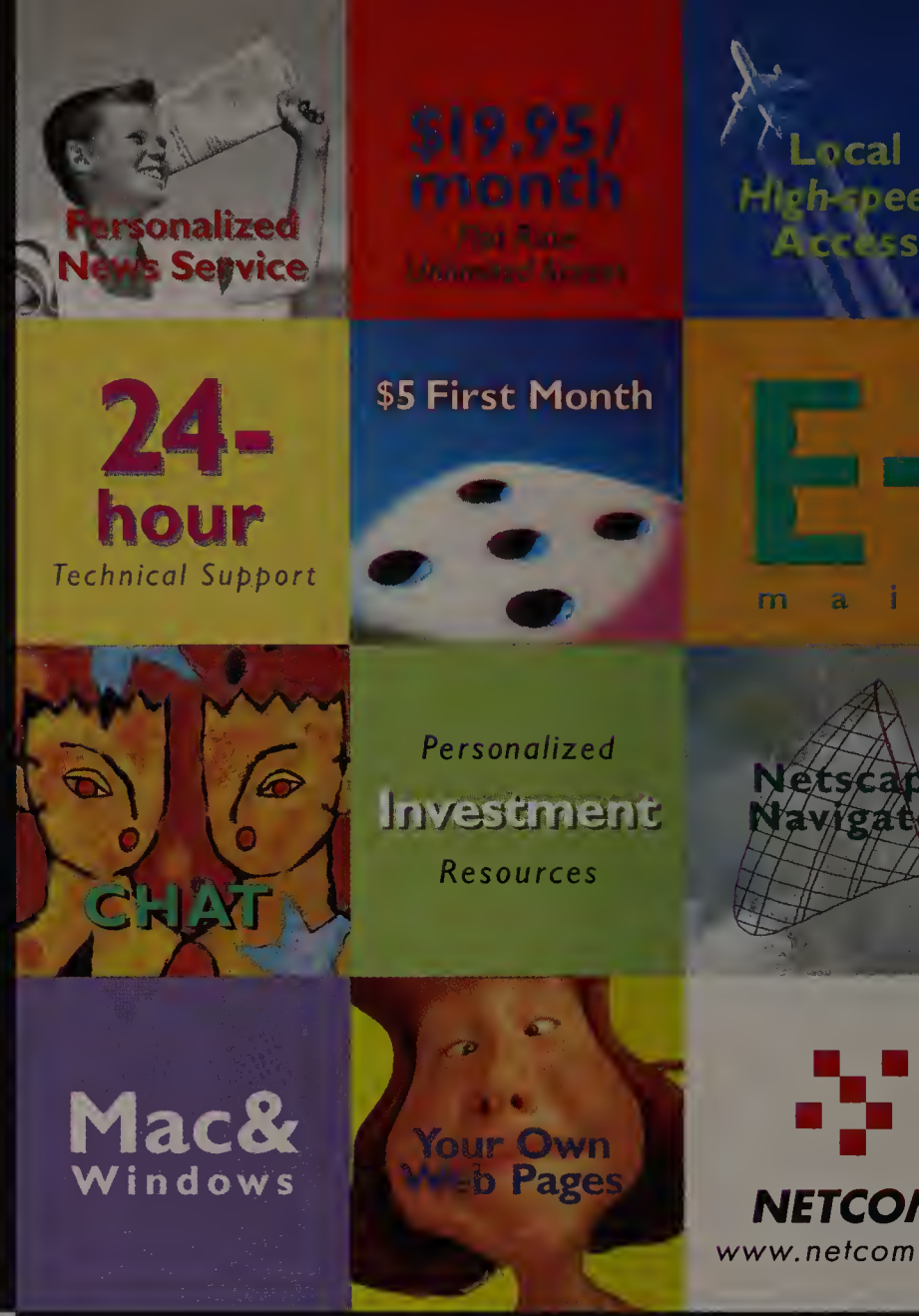

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The Albert Gore Information Overload Clinic

by Matthew Hawn

Hello, my name is Matthew and I am an information addict. I suppose I can blame the Scholastic book service for hooking me in the second grade. You know the program. You get to select books and magazines from a catalog, cough up a few dollars of your milk money, and Scholastic mails you the goods in a week. At age ten, I had more library cards than Donald Trump has credit cards. But I didn't stop there. Pretty soon I was cadging money for pamphlets, 'zines, and graphic novels.

And then I bought my very first modem.

In no time, I was sucking down data for hours at a time using a local BBS. But it wasn't until I took my first drink from the information firehose they call the Net that I hit rock bottom. My mouse hand still shakes when I remember those lost weekends. That's when I checked into the Albert Gore Information Overload Clinic.

After I'd spent a few weeks in information detox, a bevy of lab-coated technicians began my reeducation on exploring the Net. The first thing they treated me for was the fear that I was missing something important if I wasn't online constantly. Perpetual Net crawling just isn't necessary, my doctors explained, if you use the Net in a smart and organized way. In fact, if you spend too much time online, you tend to be overwhelmed by information so that it all becomes white noise. It's like overeating. If you think there are a lot of rules about how much cholesterol is good for you, you should see the clinic's guidelines for safe levels of online information consumption. Here's what I learned.

Stemming the E-mail Tide

A strange Free Stuff virus hits new visitors to the Net. There's one primary means of infection—giving out your E-mail address in exchange for something free. You'll pick it up from word-a-day services or contest-entry forms on Web pages, or by subscribing to Internet mailing lists run by businesses. Once your E-mail address gets on a marketeer's list, you have little or no control over how it gets used. Think twice before filling out those forms and take a minute to read the fine print. Unless the company explicitly promises not to sell or redistribute your E-mail address, chances are you will be added to a junk-mail list. See *Consumer Advocate*, elsewhere in this issue, for help getting off junk-mail lists.

The good doctors also introduced me to the concept of E-mail filtering. E-mail filters are included with products like Apple's Cyberdog (free; 408/996-1010, *http://www.cyberdog.apple.com*), Qualcomm's Eudora ($89; 619/658-1200, *http://www.qualcomm.com*), and Claris's Emailer ($49; 408/987-7000, *http://www.claris.com*), and they use a series of customizable rules to prescreen your E-mail, file it into searchable folders, even reply automatically. You can screen and route your mail by subject, sender, or message content. Think of them as personal assistants for handling your E-mail. Learning to use these filters and their search capabilities makes it much easier to handle a larger volume of mail in less time.

By comparison, the Mac E-mail clients for America Online and CompuServe currently offer poor filtering, search, and storage features, so if you get a lot of E-mail, consider switching to a direct Internet service provider that supports Cyberdog, Eudora, or Emailer.

Speaking of online services, I can't legally discuss the treatment that the clinic inflicts on AOL chat-room addicts. Suffice it to say they are kept in a separate, secure ward. I can still hear their screams in my nightmares.

Newsgroup Therapy

Usenet newsgroups can be another information quagmire, and the doctors were ready with a prescription for handling this, too. The

continues

amount of information here is staggering. There are more than 7000 newsgroups covering a wide range of topics, from groups dedicated to doting pet aficionados to prurient fantasy groups that could make a Tailhook sailor blush. Following the doctor's Rx for reducing newsgroup intake, I started with a list of Usenet FAQs (*http://www.cis.ohio-state.edu/hypertext/faq/usenet/FAQ-List.html*) to sort through the groups that really piqued my interest before I subscribed. The doctors limited me to five newsgroups, so, following the detailed instructions in the FAQ for each group, I chose two moderated groups and subscribed to E-mail–based digest versions of the other three. The directions for subscribing to digests by E-mail were slightly different than for regular newsgroups, but the FAQs helped me through the procedure.

Moderated groups are filtered by a volunteer host who scans all posts to the newsgroup, trying to keep things focused on the topic and posting only the good stuff. This reduces the number of arguments and flames, accidental postings, and inappropriate material such as advertising. The number of posts is therefore quite low and the quality high. E-mail–based digests are daily or weekly collections of posts to a newsgroup that I choose to get via E-mail so I can read them offline at my leisure; and since I know I'll get all the latest posts, I don't need to browse each day for new information.

Shareware PICKS

With the vast quantity of information that moves across the Net, data compression is an absolute must, but you don't want to think about it when downloading files. Aladdin Systems' **StuffIt Expander** software ensures that you don't have to. StuffIt Expander 4.0.1 (freeware) and its companion program **DropStuff with Enhanced Expander** ($30 shareware) are essential tools for handling the confusing range of compression techniques. Get Expander 4.0.1, which can handle almost every compressed file you might download from the Net. DropStuff adds support for the rest.

You'll find both applications in Macworld Online's Shareware Library on AOL and on our Web site (*http://www.macworld.com/software/*).

Untangling the Web

My final treatment focused on managing my Internet address book to keep track of URLs for my favorite Internet sites and E-mail addresses. The first rule is to keep them all in one place. Because the built-in bookmark features for most browsers are so bad, and few handle different types of URLS, serious Net travelers should have a third-party tool for this. I chose DragNet, a drag-and-drop URL manager from OnBase Technology ($39.95; 714/830-5682, *http://www.onbasetech.com*), to keep track of where I had been. Like all databases, it's only as good as the information I put into it, but I got good at annotating sites that I intended to revisit. DragNet's search and export tools are first-rate, and it keeps track of all the different kinds of Internet addresses I need, including mail and FTP.

I also learned a great trick from one of the interns: when you are using someone else's machine to browse the Net, you can use the browser's built-in mail features to send yourself the URL via E-mail with comments, to add to your bookmarks later.

Leaving the Clinic

I turned in the regulation fuzzy bunny slippers and bathrobe and changed into my street clothes.

The head shrink walked me out to the cab. She looked at me grimly over the frames of her glasses.

"Mr. Hawn, when you first arrived, your eyes were bloodshot and your skin a strange, pale shade of green. We've taught you techniques to minimize the symptoms of your disease, but that is only half the solution. Remember that unplugging from the digital world is the only way to stay healthy. Take a bike ride, visit the Far East, or nap under a tree in your garden."

I smiled back as I shook her hand.

"I will, Doc, I promise. I'll do a little browsing tonight and plan my next vacation. I hear HotWired has a great travel channel these days." **m**

MATTHEW HAWN can be found during this month sniffing daisies and skipping in San Francisco's Golden Gate Park. He will not be reading E-mail.

Web Worthy

In the coming year, you'll hear a lot more about intelligent agents: tiny software bots that cruise the Net finding you the information you want. The hype about them will be intense, but we want to remind you that we already have intelligent agents for sorting and prioritizing information. They are called editors.

Macworld has some of the best human agents for sorting through the morass of information on the Macintosh and bringing that information to your computer desktop via Macworld Online. Here are some other intelligent agents on the Web that we recommend.

Salon and Feed Some of the sharpest writing on the Net can be found at these sites. If any webzines can claim to be the online stepchildren of *The New Yorker*, bet on Salon (*http://www.salon1999.com/*) and Feed (*http://www.feedmag.com*). Both cover politics, movies, books, and ideas.

ESPNET SportsZone ESPN's (*http://espnet.sportszone.com/*) coverage is thorough, up-to-the-minute, and worth every penny of its $4.95 per month charge ($39.95 per year) if you are a sports fan. ESPN's customizable information shows the potential for personalized news delivery online.

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BoxTop Software

"GIFmation" is the first Mac video editor for cr ating GIF animations and the easiest tool to ado motion to your web pages. GIF animations require no CGI scripts, no browser plug-ins, an no server access! They are as simple as <IMG SRC=animation.gif> and provide backwards cor patibility. GIFmation™, has the most advanced features available and makes creating them a snap. boxtop@aris.com 1-800-257-6954

http://www.aris.com/boxtop

MacSourcery

Screen Saver Factory

Create your own screen savers with CinéMac for Director, and sell them or give them away, royalty free.

http://www.macsourcery.com

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Impossible Software

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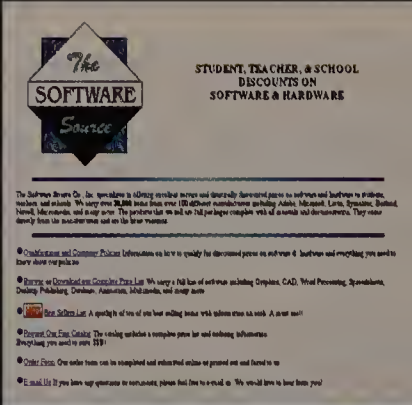

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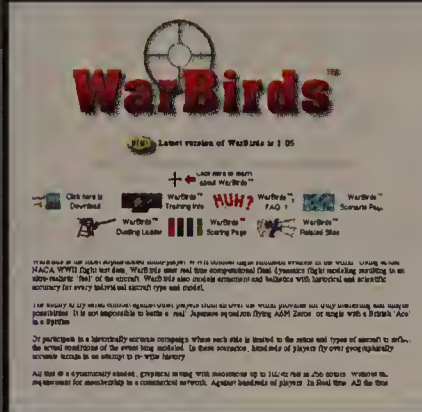

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Media

Animating Your Web Site

TOOLS AND TRICKS FOR CREATING MOVING EXPERIENCES ON THE WEB

by Jim Heid

Technology for the Web is evolving faster than Apple's org chart, and one of the fastest-moving targets is motion itself: animation. Many commercial products are, or soon will be, available for creating animations that play back via browser plug-ins. The best known is Macromedia's Shockwave, which lets Director projects play over the Web. Sun's Java is also touted as an animation medium, but its capabilities go well beyond bouncing buttons.

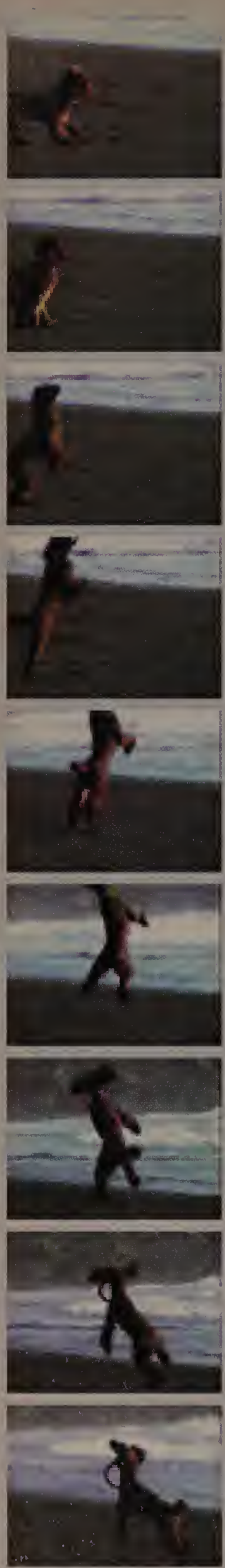
One problem with commercial Web-animation products is that they need browser plug-ins, which require Netscape Navigator 2.0 or Microsoft Internet Explorer 2.0. Millions of people access the Web with other browsers, and even Navigator and Explorer users may lack the plug-in you used. Most plug-ins are free and widely available, but users may not want to download and install them. Many plug-ins impose a high memory overhead and can make browsers unreliable. A Web site that's trying to attract visitors doesn't make them jump through hoops just to get in the door.

Another problem is that commercial animation products generally require you to fine-tune the Web-server software to recognize the animation format. Technically speaking, you set up a *content map* that enables the server to tell a browser how to handle the incoming data. The content map associates a file extension, such as Shockwave's .dcr, with the right plug-in. That's a two-minute tweak if you operate the server, but it can be major drama if an Internet service provider hosts your site. And if you run a site through an online service such as America Online, it's downright impossible.

One form of Web animation requires no plug-in, works with Navigator and Explorer, and needs no server tweaking. It's the animated GIF, and you've surely seen it popping up and moving around on Web sites. This month I cover creating animated GIFs, and I survey some commercial animation options. For samples, software, and more details check my site (*http://www.heidsite.com*).

The Animated-GIF Story

Animated GIFs are a variant of CompuServe's Graphics Interchange Format. In 1987 the specification was enhanced to allow for GIFs containing multiple images that can play back sequentially to provide flip-book–style animation. A 1989 amendment added such controls as an optional delay between frames. Thus was born the GIF89a format—another

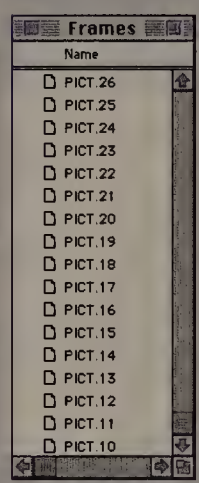


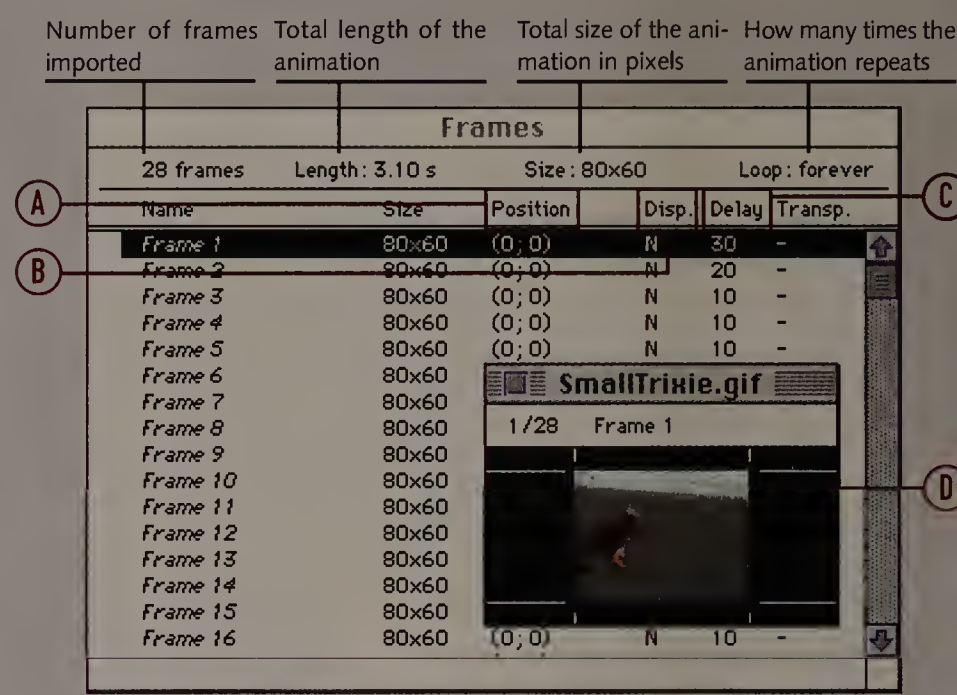
ANIMATING WITH GIF

You can create an animated GIF from any series of images, including images drawn with a paint program or rendered by a 3-D package or, as shown here, frames of a QuickTime movie. All you need is a series of images in the appropriate format and a program that combines them into an animated GIF. You import these files into a utility that can create animated GIFs. The best known is GifBuilder (shown here), which can read PICT, GIF, or TIFF files and then create a GIF89a file containing each image. You add the GIF89a file to a Web page with a line of HTML.

1 Get Your Frames in Order

Most programs with animation features can export an animation as a series of image files. GifBuilder arranges the files in alphabetical order, so be sure to name the original files accordingly. Most animation-oriented programs provide automatic-naming features that number frames appropriately.





2 Import the Frames

Open GifBuilder, then switch back to the Finder, making sure GifBuilder's Frames window remains visible. Select all of the files and drag them to the Frames window. (For drag-and-drop import to work, you must be using System 7.5.X or System 7.1 with the Apple Macintosh Drag and Drop extension installed. Otherwise, you must import the images into GifBuilder one at a time.)

3 Fine-Tune Your Toon

After importing frames, you can fine-tune the animation: specify timing, the way frames appear, whether the animation loops or plays just once, and more.

(A) Position

You can specify the position of each frame within the animation. You might use this option with a static image to create the illusion of movement—say, a ball bouncing: make the frames containing the ball image only as large as the ball itself, then change the position of each frame within the movie to create the bouncing effect.

(B) Disposal

The disposal method specifies how or whether a frame is removed after being displayed. For GIFs converted from QuickTime movies, you'd usually choose Do Not Dispose or Unspecified, since each new frame covers up the previous one. When moving frames within a larger animation, use Restore to Background to avoid having each frame remain visible.

(C) Delay

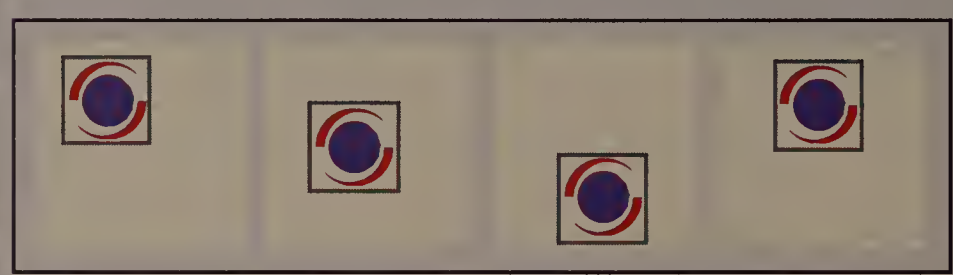
The GIF89a spec lets you specify how long (in 100ths of a second) a specific frame stays visible. Setting the first and second frames to be visible slightly longer than the remaining frames simulates a movie getting up to speed. To play back animation as quickly as possible, set delay to zero. The speed with which the animation plays the first time depends on the speed of a visitor's Internet connection; fortunately, browsers that support animated GIFs show each frame as it's received, so visitors don't stare at a static screen waiting for large animations. Subsequent plays of looping animations are much faster, since the browser loads each frame from the browser's disk cache.

(D) Preview

Choosing Show Animation (⌘-M) brings up a window where you can preview the animation and change the position of individual frames. Tip: To step forward and backward through the animation, press the up-arrow and down-arrow keys.

4 Add HTML

To include the animated GIF in an HTML page, use a standard **IMG** tag (**<IMG SCR="SmallTrixie.gif" WIDTH="80" HEIGHT="60">**). The optional **HEIGHT** and **WIDTH** tags help the browser format the page faster. Tip: To run the animation in several places on a page, copy and paste the GIF's **IMG** tag. (In an HTML layout program such as Adobe PageMill, option drag the image to make a duplicate copy.) There's no performance penalty for repeating an animation; the browser loads the image only once.



Tools for Making Animated GIFs

- **GifBuilder** by Yves Piguet (freeware; *http://iawww.epfl.ch/Staff/Yves.Piguet/clip2gif-home/GifBuilder.html*).

- **WebPainter** from Totally Hip Software ($49; 604/685-6525, *http://www.totallyhip.com*), is a promising new program that provides solid animation features, including an onionskin feature that shows adjacent frames, simplifying the animation process. WebPainter can also convert QuickTime movies into animated GIFs. Animations can be saved in GIF format as well as in Totally Hip's Sizzler plug-in format.

- **Smart Dubbing** from Netherlands-based Maatschap Blom/Verweij ($25 shareware; *http://www.xs4all.nl/~polder*), converts QuickTime movies and PICS animations into animated GIFs. An included Java applet offers rudimentary sound support.

- **GIFmation** from BoxTop Software ($89; 601/324-7352, *http://www.aris.com/boxtop*), is a promising program that I tested in early prerelease form. The final version is currently scheduled to ship in August. Unlike WebPainter, GIFmation does not provide built-in painting features, but it does provide excellent color-reduction and palette-management features, as well as image-alignment niceties that GifBuilder lacks.

moniker for animated GIFs. GIF89a was in a state of suspended animation until Netscape added support for it to Navigator 2.0. Microsoft followed suit, supporting the format in Internet Explorer.

Animated GIFs are easy to create. Yves Piguet's GifBuilder lets you drag and drop image files from other programs to create animations. From there, a standard **IMG** tag is all it takes to put your pages in motion. Another nicety: you can create looping animations—ones that play over and over. Once a browser has loaded the GIF, the animation plays back from the browser's disk cache.

Now the Bad News

For all their advantages, animated GIFs aren't perfect for digital Disneys.

Limited Color Palettes Because animated GIFs *are* GIFs, they're limited to 256 colors (see *Media*, *Macworld*, May 1996). They're far from ideal for photographic images, such as a time-lapse view of a sunset. They're best for moving banners, buttons, or animated line art.

Limited Playback Control You can stop a looping GIF animation with a browser's Stop button and start over by reloading the image, but you can't stop and resume playback where you left off. If you need VCR-like playback control, use a commercial animation program.

Frame Woes on Other Browsers Animated GIF does appear in browsers that don't support GIF89a, but *how* it appears depends on the browser. The AOL browser displays only the last frame of the animation, but most other browsers, including Navigator 1.X and Internet Explorer 1.X, display only the first frame. The latter approach complicates life if you want to create, say, a logo that assembles itself: all that appears on first-frame-only browsers is a disassembled logo. To ensure that an animated GIF looks good on all browsers, make the first and last frames presentable.

This doesn't apply, of course, if you're creating separate pages for separate browsers and your server routes visitors to the right page for the browser they're using. In this case, use static GIFs for the browsers that require them.

No Talkies Animated GIFs are silent movies; if you want to mix sound and animation, use QuickTime movies, Macromedia's Shockwave for Director, or DeltaPoint's forthcoming WebAnimator.

Fade-Out

Despite its shortcomings, the animated GIF is the best medium for simple Web animation: no plug-ins, no server tweaking, and relatively mild browser-compatibility headaches. The animated GIF is a simple technology that has come to dominate its field exactly because it's simple. In a Web world increasingly obsessed with bells and whistles, that's an important lesson. **m**

Next month: Cross-platform media tips

Contributing editor JIM HEID produced the Macworld Power User Clinic CD, which accompanies his *Macworld New Complete Mac Handbook*, fourth edition (IDG Books Worldwide, 1995).

Comparing Current Plug-in Animation Technologies

Product	List Price*	Pros	Cons
3D Web Workshop (Specular International; 413/253-3100, *http://www.specular.com/*)	$399 (without PageMill, $249)	Includes GifBuilder, Adobe PageMill, Web-oriented versions of Specular's LogoMotion (3-D animation) and TextureScape (background-texture generator, and clip art).	Results are simply animated GIF files, with the attendant drawbacks: 256-color maximum, no sound.
CelAnimator (FutureWave Software; 619/552-7680, *http://www.futurewave.com/*)	Free during beta period (will be $250)	Transmits vectors (compact drawing instructions) not bitmaps; yields compact files. Supports streaming (files play as they download); antialiased text; powerful and well designed.	Vector orientation makes it unsuitable for converting QuickTime movies or PICS-based animation; no sound support (planned for future versions).
Emblaze (Geo; 972-3-5733288 *http://www.geo.inter.net/Welcome.html*)	Free during beta period	Supports streaming; supports sound.	256-color maximum; minimal interactivity within animations—an entire animation can be a hot spot, but not elements within one as with most other packages.
Macromedia Director (Macromedia; 415/252-2000, *http://www.macromedia.com*)	$850	Afterburner utility and Shockwave plug-in adapt projects to the Web. Superb animation controls; full sound support; full interactivity within animations.	No streaming—animations download fully before playing; stiff memory requirements (future versions will support streaming and lower memory overhead).
Sizzler (Totally Hip Software; 604/685-6525, *http://www.totallyhip.com/*)	Free during beta period	Easy drag-and-drop conversion of PICS files and QuickTime movies; supports streaming.	No sound support; minimal interactivity within animations (both sound support and enhanced interactivity are in the works).
WebAnimator (DeltaPoint; 408/648-4000, *http://www.deltapoint.com/*)	Free during beta period (will be $295)	Supports vectors and bitmaps; imports PICS animations and QuickTime movies; supports sound and interactivity within animations.	Windows version unavailable at this writing.

**List price of authoring tool required to create animations; the plug-ins for each technology are free and available for downloading from each company's Web site.*

Publishing Workshop

Paragraph Styles in QuarkXPress

by David Blatner

"I don't use style sheets." These are words only a person who bills by the hour could love. Yet I hear them time and time again at seminars and conferences around the country. Style sheets are so incredibly useful that it's hard not to stare blankly at these people and wonder aloud if they were raised by wolves or something.

What are these mysterious things called style sheets, and why should you use them? A *style sheet* (also known as a *paragraph style*) is a collection of text formatting with a name. For instance, you can create a style sheet named Body Text for type that is styled 11-point Palatino italic with 15-point leading and a first-line indent of .25-inch; or you might call 14-point Helvetica bold Head1. Paragraph styles always apply to an entire paragraph. (Styles that apply to a single word or sentence are called *character styles*, but neither QuarkXPress nor Adobe PageMaker currently supports them.)

There are three great arguments for using paragraph styles religiously.

• Paragraph styles let you apply formatting very quickly. Without styles, you have to select a paragraph (or group of consecutive paragraphs), then apply the font, then the size, then the leading, then the indents, and so on—repeating the process every time the style changes in the document. Once you've created a style sheet, one click lets you tag a paragraph with all that formatting (versus five or more clicks without styles).

• Style sheets let you change formatting quickly. You know as well as I do that as soon as you finish a document, your boss will want to change something. If you need to change a font and you didn't use paragraph styles, you'll have to go back and change each paragraph or group of paragraphs. If you did use style sheets, you can just redefine that particular style sheet, and the program updates all the appropriate paragraphs for you. For instance, you can change Body Text to 10 point instead of 11 point, and every paragraph that you tagged with Body Text changes.

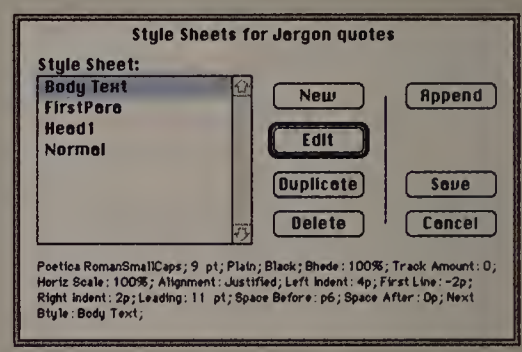
• Style sheets make it much easier to move from a word processor to a page-layout program. I apply style sheets to my text in Microsoft Word while I write and use fonts like Geneva and New York because they're easy to read on screen. But of course I'd never use them in a printed document. If you give the style sheets in your XPress file exactly the same names as the styles in Word, when you import the document XPress can replace the old formatting

Build by Example

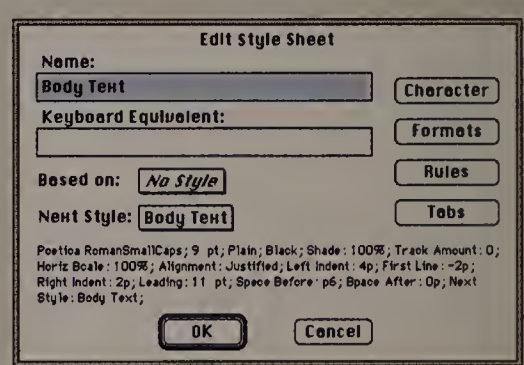
Most people think you have to create style sheets by specifying the font, size, leading, and so on in a series of dialog boxes. You can . . . but that's the slow way. The fastest way to make a paragraph style in QuarkXPress is to build it by example.

1. Format an entire paragraph so that it looks just the way you want it to.

2. Open the Style Sheets dialog box (select Style Sheets from the Edit menu, or ⌘-click on any style name in the Style Sheets palette).



3. In the Style Sheets dialog box, click on New. Then, in Edit Style Sheet, give the style a name and click on OK. Finally, click on Save to get out of the Style Sheets dialog box.



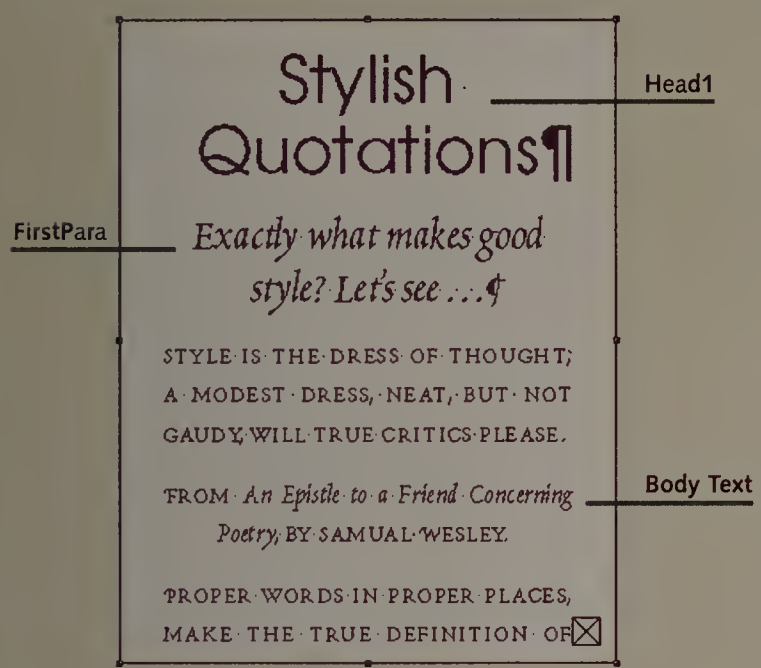
Voilà! The style sheet is made. (Note that it isn't applied to your example paragraph until you click on its name in the Style Sheets palette.)

with the new automatically (see "Importing Styles").

Just Style It

Why do most people neglect these time-savers? They mistakenly think paragraph styles are difficult to make and use. Here are some tips and tricks to get you started with styles. They're specific to QuarkXPress, but you can do similar things in PageMaker or Word. I encourage you to jump in and try them. And here's a rule to live by: Anytime you have more than two pages of text (and often even when you have fewer), you should be using style sheets. Unless, of course, you charge by the hour and your boss isn't watching. ■

DAVID BLATNER, who speaks on desktop publishing topics around the world, is at work on *Real World QuarkImmedia*, due this fall from Peachpit Press.



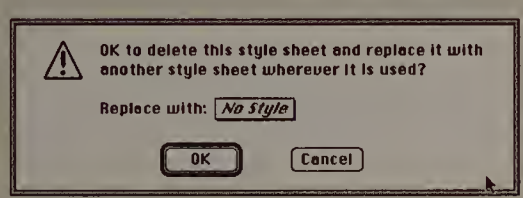
Search and Replace

It's frustrating that there's no Find/Change function for style sheets in QuarkXPress. Or is there? Here's a way to change all the paragraphs tagged with one paragraph style (let's call it OldStyle) to a different one (NewStyle).

1. Open the Style Sheets dialog box and click on OldStyle.

2. Click on Duplicate. This creates a copy of OldStyle and lets you name it (the name doesn't matter, so let's go with XPress's suggestion, Copy of OldStyle). Click on OK.

3. Select OldStyle again and click on Delete. At this point, QuarkXPress asks you which style you want to replace it with. Select NewStyle and click on OK. This is the crucial "Find and Change All" step.



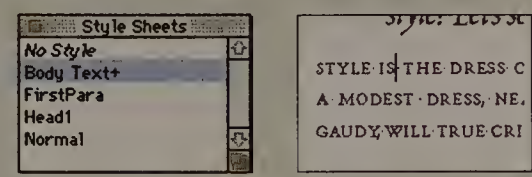
4. Finally, choose Edit and rename Copy of OldStyle as OldStyle. Click on OK and then click on Save to get out of the dialog boxes.

Steps 2 and 4 ensure that OldStyle remains in your style sheet list when you're finished. If you don't need it again, just omit those steps.

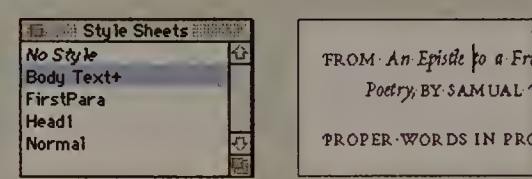
Local Formatting

Let's say you've created a style, Body Text, and applied it to a paragraph. You can still go in and change one or more words to a different font, size, color, or whatever. You are applying local formatting on top of the style.

If your cursor is anywhere in a paragraph where there's local *paragraph* formatting (such as leading or indents), the Style Sheets palette displays a plus sign next to the style sheet's name.



If there's local *character* formatting (font, size, color, and so on), the plus sign only appears when the cursor is on those particular characters or the selected text includes them.

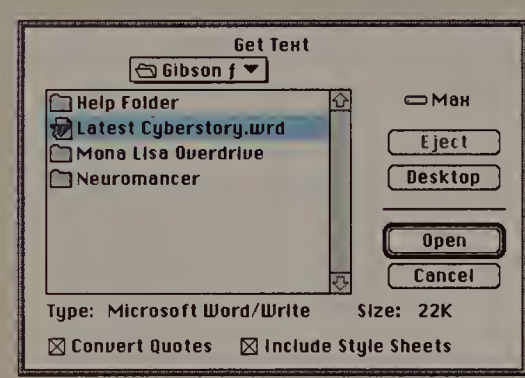


To get rid of all the local formatting in a paragraph, select No Style from the Style Sheets palette, then reselect the style. Anytime you apply a style to a paragraph that has No Style, it wipes out *all* the local formatting (both character and paragraph).

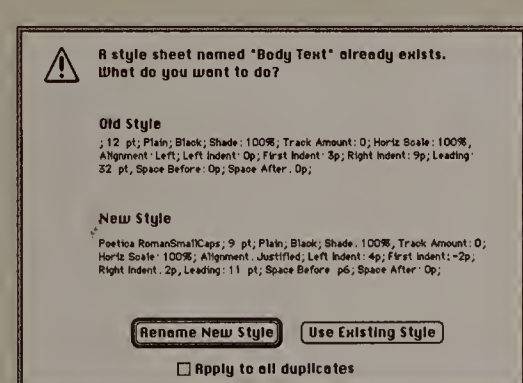
Importing Styles

When people ask me how I can format an entire book in under a week, I tell them the truth: I apply style sheets in Word, then import the files into XPress. This easy technique has saved me hundreds of hours of work.

I usually check the Include Style Sheets box in the Get Text dialog box. This ensures that my Word styles import properly. Here's another benefit: if you haven't applied style sheets, checking this box makes XPress import all text as Normal style (otherwise, you'd get the dreaded No Style, which wipes out all your local formatting if you later apply a style sheet to the paragraph).



If your XPress file already contains style sheets with names identical to those in the Word file, XPress asks if you want to rename the incoming styles (keeping all the old formatting) or use the ones in XPress (changing to the formatting of the XPress style). Typically, you want to use the ones you've built for your XPress document. And if you have a lot of style sheets, be sure to check the Apply to All Duplicates box!



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Graphics Workshop

Layering Bitmapped Images with PostScript Type

by Cathy Abes

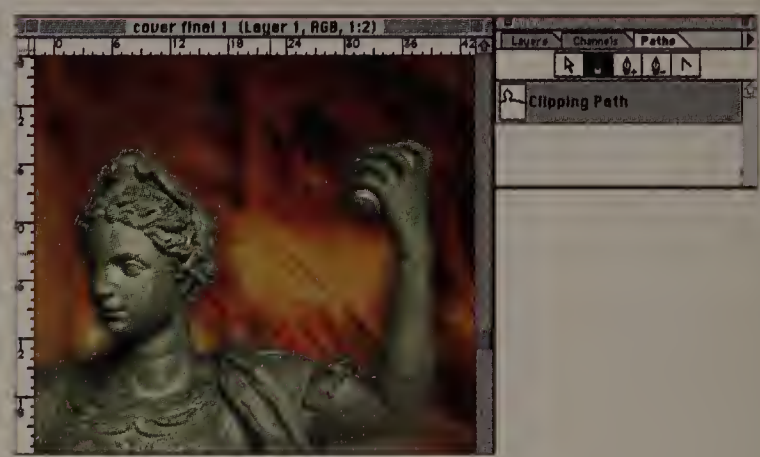
ARTIST: Formerly the art director for *Electronic Musician* and a *Macworld* designer, Andrew Faulkner now runs his own studio, producing designs, illustrations, and multimedia for such clients as Adobe and *Scientific American*. You can view his work at *http://www.well.com/~illustrw*.

HOW IT WAS DONE: For this imaginary magazine cover, Faulkner wanted an image partly obscured by type and partly overlapping the same type. He used two Photoshop images—one duplicating part of the first and containing a clipping path—and layered them in QuarkXPress with type sandwiched in between. This technique also works in other page-layout programs, such as Adobe PageMaker.

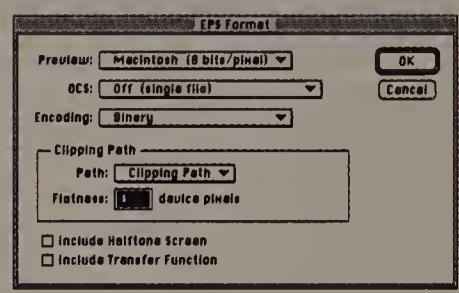
Doing the layering in QuarkXPress allowed him to use PostScript type, which looks much sharper than type created in a pixel-based program like Photoshop. Of course, to apply special effects such as filters or blending modes to type, as Faulkner did to the transparent type in the image, forget PostScript—pixels are the only way to go.

In QuarkXPress, Faulkner drew a picture box roughly the same size as the first Photoshop image, and placed the image. After placing the PostScript type, he created a picture box with the same vertical and horizontal offsets as the first so he could automatically position the final layer exactly to complete the layering effect.

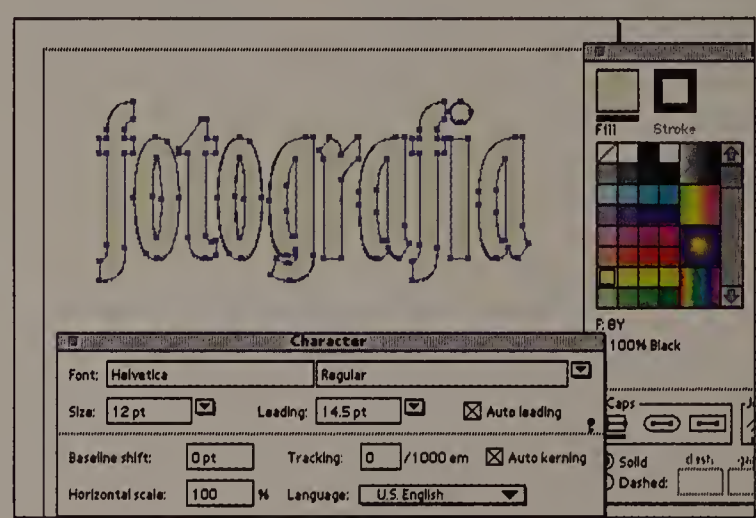
THE TOOLS **Hardware:** Power Mac 7100 with 40MB of RAM and 1GB internal hard drive; Apple Multiple Scan 17 Display; APS 270MB SyQuest drive; internal Toshiba CD-ROM drive. **Software:** Adobe Photoshop 3.0; Adobe Illustrator 6.0; QuarkXPress 3.3. m



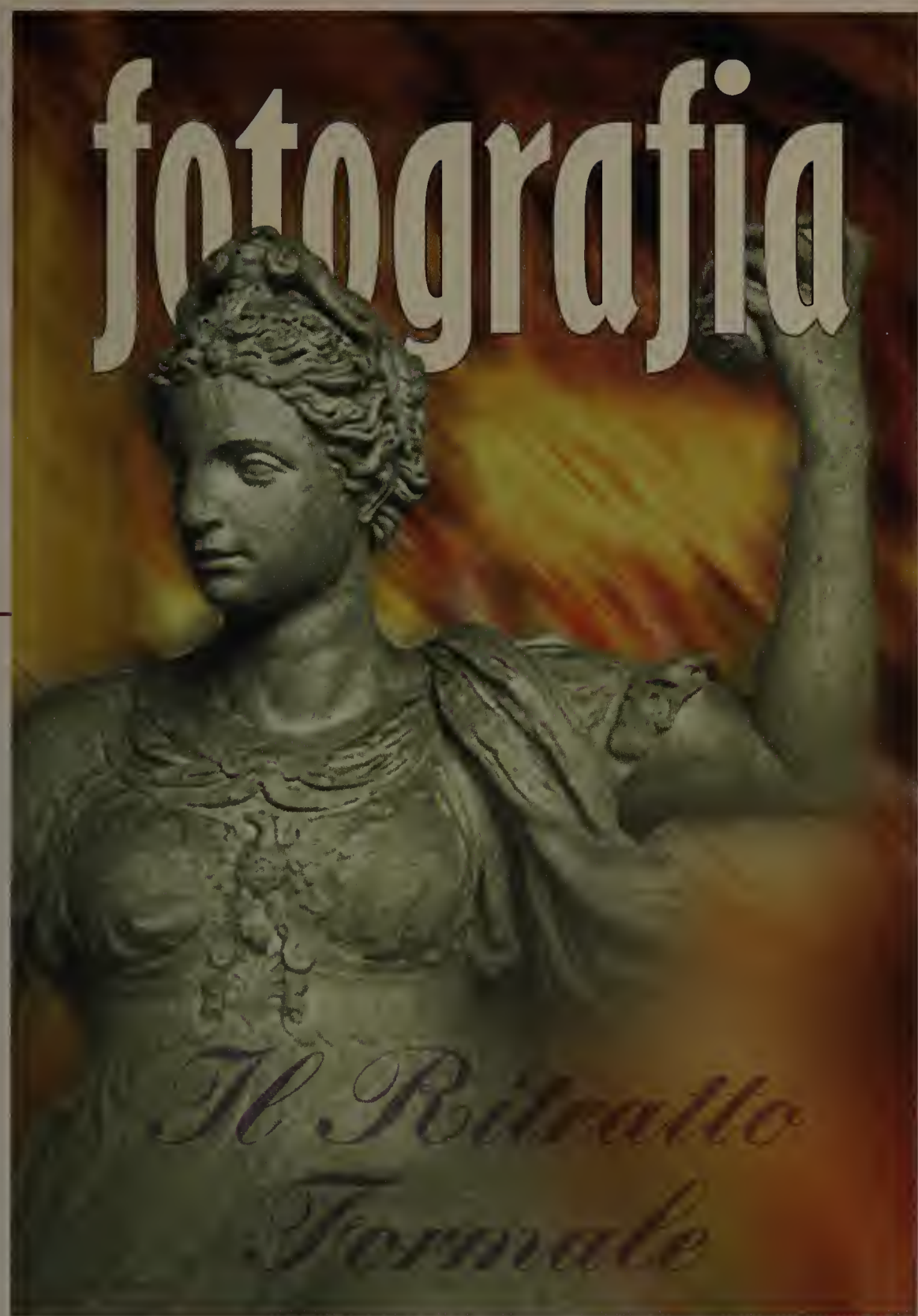
1 After duplicating the top portion of the statue image in Photoshop, Faulkner drew a path around the statue's head and shoulders and made it into a clipping path to mask out the arm and the background area surrounding the head.

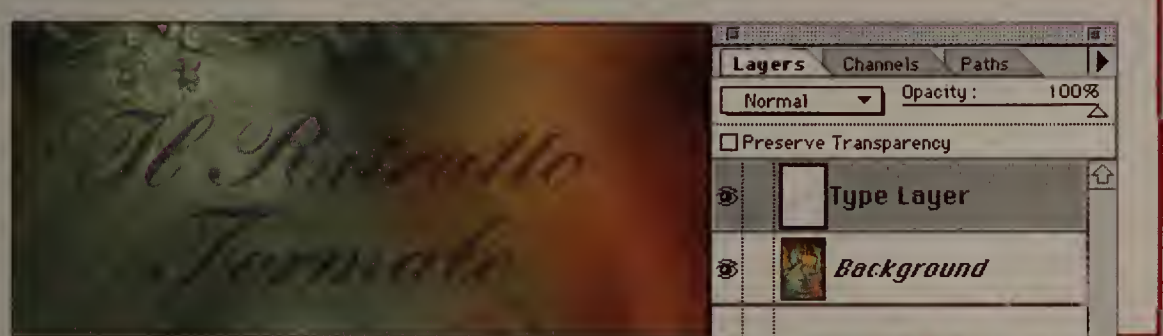


2 Faulkner saved the duplicate image as an EPS file so he could save and export the clipping path to QuarkXPress; had he saved the file in any other format, the clipping path would not have been saved. Once you designate a clipping path, it's automatically chosen in Photoshop's EPS Format dialog box.



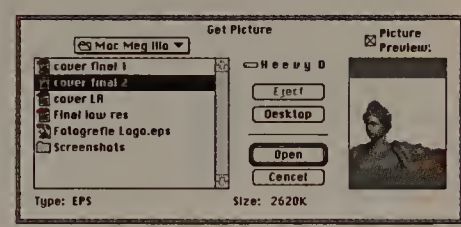
3 The PostScript type Faulkner created in Illustrator and saved in EPS format, which would become the second layer of his overlaid image in QuarkXPress.



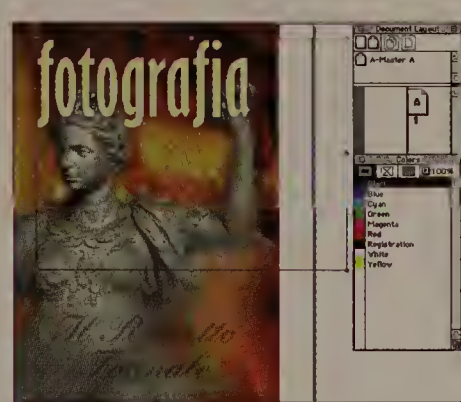


4 Although this type lacks the clean lines of the PostScript type, because it was created in Photoshop, Faulkner had access to Photoshop's full range of special effects—in this case transparency, which he would not have had with PostScript.

7 The QuarkXPress file after Faulkner placed the second Photoshop file with the clipping path over the first Photoshop image and the type to complete the layering effect.



6 To position the second Photoshop file (the third layer in the series) precisely, he used Quark's Step and Repeat command (with Repeat Count of 1 and offsets of 0) to duplicate the first picture box with the same vertical and horizontal offsets. But because the duplicate had the same contents as the original, he chose Get Picture to replace it with the clipping path.



5 The QuarkXPress file with the Illustrator type placed over the first Photoshop image.

This image produced with a Nikon F4s, Scantouch 110 and Coolscan II.

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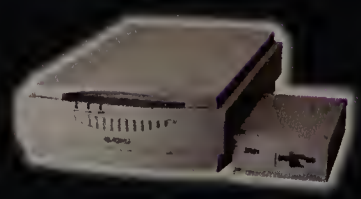

Coolscan II

*Scantouch 110 comes with Adobe Photoshop™ LE and Caere OmniPage® LE. Coolscan II comes with Storm Primax EasyPhoto.™
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Buyers' Tools

Personal Laser Printers

MACWORLD LAB PICKS THE BEST PRINTER FOR SMALL AND HOME OFFICES

by Robert C. Eckhardt

No doubt about it, the era of the paperless office has come—and gone. Despite electronic mail, high-capacity disk drives, automatic archiving utilities, even an act of Congress, the printed page remains unavoidable. Thus it pays to get a printer that produces good-quality text and graphics and doesn't waste your time doing so. And for small-business and home-office uses, acceptable speed and performance shouldn't bust the budget.

For all kinds of businesses, the laser printer has long been the print engine of choice. Macworld Lab tested seven affordable laser printers: Texas Instruments' microLaser Pro/8 (*http://www.ti.com*), Hewlett-Packard's LaserJet 5MP (*http://www.hp.com*), Lexmark's 4039 10plus (*http://www.lexmark.com*), Okidata's OL810e/PS and OL610e/PS (*http://www.okidata.com*), and Apple's LaserWriter 4/600 PS and Personal LaserWriter 300 (*http://www.apple.com*). We evaluated the high and low points of each printer, all with an eye toward choosing the best small-business laser printer for the best price.

All seven printers cost less than $1500, handle paper sizes up to 8½ by 14 inches, have a power-saver option (essential for the LaserWriters, which lack on/off switches), and are covered by a one-year warranty. The LaserWriter 300 is the only QuickDraw printer in the group; it prints at 300 dpi and comes with 31 TrueType fonts. All the others are equipped with Adobe PostScript Level 2 interpreters (the Lexmark has a non-Adobe PostScript clone), offer similar collections of 35 to 39 built-in PostScript typefaces (23 in the TI microLaser), and print at 600 dpi (or a hybrid 1200 by 600 in the Okidata OL810e/PS). Despite the many similarities, we found important differences relevant to a buying decision.

KEVIN CANDLAND

First, though, why should you buy a low-end laser printer instead of a color ink-jet printer? Ink-jets are usually a lot cheaper and often quite compact (especially compared with the Lexmark 4039 and TI microLaser Pro/8, the bulkiest laser printers we tested). Ink-jets, however, are slow (see *Buyers' Tools*, *Macworld*, April 1996). Despite impressive-sounding resolutions (up to 720 dpi), ink-jet type tends to look dark and chunky. Also, the ink fades rapidly and smudges under a damp thumb. All in all, except where color or rock-bottom hardware price is essential, laser printing remains the logical choice for small businesses.

Full Speed Ahead

Don't get me wrong—affordable laser printers aren't the speediest printers on the market, either. We've tested workgroup laser printers that are much faster, but their list prices are almost four times as high (see "Heavy-Duty Printers," June 1996). So once you've adjusted to this little lesson in economic reality, it's appropriate to ask how affordable laser printers stack up against each other.

In terms of overall performance (see the benchmark, "Balance Speed . . . with

Fast Facts on Laser Printers

Company	Product	Star Rating *	List Price/ Company's Estimated Price **	Phone	RAM (Base/ Maximum)	Standard Ports	Tray Capacity, Input/Output (in sheets)
Apple Computer	LaserWriter 4/600 PS	★★★/5.6	NP/$929	408/996-1010	2MB/6MB	LocalTalk	100/25
	Personal LaserWriter 300	★★/4.3	NP/$652	408/996-1010	512K/512K	serial	100/25
Hewlett-Packard	Editors' Choice LaserJet 5MP	★★★★/7.1	$1299/$1099	408/246-4300	3MB/35MB	infrared, LocalTalk, two parallel	350/200
Lexmark	4039 10plus	★★★/5.7	$1249/$1050	606/232-2000	2MB/10MB	parallel, serial	200/250
Okidata	OL610e/PS	★★/4.9	$949/NP	609/235-2600	2.5MB/18.5MB	LocalTalk, parallel	100/150
	OL810e/PS	★★★/6.1	$1439/NP	609/235-2600	3MB/19MB	LocalTalk, parallel, serial	250/200
Texas Instruments	microLaser Pro/8	★★★/6.5	$1299/$1150	800/848-3927	3MB/19MB	LocalTalk, parallel	500/250

*NP = Not provided. *Based on features, implementation, innovation, performance, reliability, ease of use, and value. (See Star Ratings section for full explanation.) ** Actual prices could be higher or*

Quality"), the top-ranking printer is the TI microLaser Pro/8. Not far behind it are the Okidata OL810e/PS and HP LaserJet 5MP, in that order. The Okidata OL610e/PS and Lexmark 4039 turned in middling performances, while the slowest of the 600-dpi printers turned out to be the Apple LaserWriter 4/600PS. To make sure we weren't comparing Apples with oranges, we tested the LaserWriter 300, which doesn't print at 600 dpi, against the others printing at 300 dpi—and it came in dead last in overall performance at that resolution.

Subdividing performance tests into text and graphics/page layout categories, we found that rankings are similar to the overall scores—except for the Lexmark 4039. In the graphics and page-layout test group, the Lexmark 4039 drops down a notch to occupy last place, primarily because of serious foot-dragging by its PostScript-emulation software. In text tests, however, the Lexmark sprints all the way to first place. Although fast at text, the Lexmark 4039 is not a good choice for anyone who frequently prints PostScript documents.

The Eye of the Beholder

Macworld Lab assembled more than a dozen in-house text and graphics experts to compare the quality of three test documents (see "Balance Speed . . . with Quality"): an Adobe Photoshop image, an Adobe Illustrator graphic (both print-

Balance Speed . . .

Personal laser printers are neither as fast as workgroup laser printers nor as slow as ink-jet printers. How quickly they spit out pages depends on many variables, including the amount of RAM; the printer's processor speed; the printer driver's efficiency; the uses of QuickDraw, Adobe PostScript, or a PostScript clone; the print engine's raw speed; the speed of the Mac sending the file; and, of course, the kind of file. Results shown below capture real-world performance on a variety of typical business and graphics tests, including printing Adobe Photoshop and Illustrator files.

Best result in test. All times are in seconds. Shorter bars are better.

	Long Single-Font Report	Short Multifont Memo	TrueType Memo	Bitmap Photograph	Illustration	Newsletter—PageMaker	Newsletter—ClarisWorks
600 dpi							
Apple LaserWriter 4/600 PS	326	267	66	214	264	247	115
Hewlett-Packard LaserJet 5MP	221	166	43	147	156	140	87
Lexmark 4039 10plus	145	144	33	256*	585*	216*	123
Okidata OL610e/PS	210	201	42	164	211	158	95
Okidata OL810e/PS**	164	155	35	157	165	138	85
TI microLaser Pro/8	170	177	35	153	111	126	70
300 dpi							
Apple Personal LaserWriter 300	366	160	56	103	129	336	123

**Couldn't print file with standard 2MB of RAM configuration, and required an upgrade to 6MB of RAM. **1200 × 600 dpi.*

Behind Our Tests

All timing tests were conducted with files sent to printers via LocalTalk (except for the Apple Personal LaserWriter 300, which used the serial port) from a Power Macintosh 7100/80 with 24MB of RAM and a 700MB internal Quantum LPS 700 drive. Times are shown for each unit's best-quality configuration tested; resolution enhancement, use of Apple's printer driver or the vendor's driver, and other configuration changes had minor impact on some print speeds. Except the Lexmark 4039 10plus (which required a memory upgrade for printing graphics), all printers were tested with standard memory.

Comments
Slow overall performance; good text and adequate-quality graphics output.
300-dpi QuickDraw printer; slow performance; grainy output; low price.
Consistently quick performance and high-quality output.
Fast text output but slow PostScript emulation; high-quality output; expensive.
Middling performance; poor text and graphics output quality.
1200 × 600 dpi; quick performance; excellent text but poor graphics output.
Speediest overall performance; poor-quality graphics output.

lower than the estimated price provided by the company.

ed using the printers' built-in graphics-enhancement technology, if available), and a sample of typefaces at several different sizes.

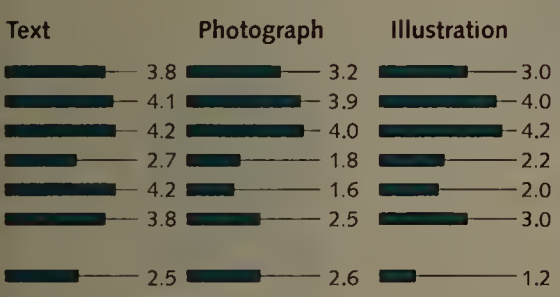
The Lexmark 4039 topped the charts in all three tests; our judges were impressed with its smooth gray-scale transitions, highlight and shadow detail, and crisp text. Right behind the Lexmark in all three tests is the LaserJet 5MP, which is followed somewhat more distantly by the LaserWriter 4/600. Tied with the Lexmark for first place in text quality is the Okidata OL810, no doubt due to its unique ability to print at 1200 by 600 dpi. Although its text quality is top-drawer, the OL810 scores at or near the bottom in the two graphics tests; the OL810 as well as the OL610 and the TI microLaser fare poorly in both these tests because of significant loss of shadow detail (in the Photoshop image) and excessive banding.

Judged substandard in text printing is the Okidata 610, whose characters, like those of the LaserWriter 300, look too thick to the naked eye and display marked jaggies under magnification. The TI microLaser's text samples, while acceptable, show toner splatter under magnification. Due to its lower resolution and marked graininess, the LaserWriter 300 finished at the bottom of the quality tests.

. . . with Quality

To judge the quality of graphic output, look for smooth transitions, crisp details, and a good contrast range; also note any variations, banding, or streaks. With text, check for rough edges, especially on slanted lines and curves.

Scores in points. Longer bars are better.



To evaluate quality, an expert panel rated output samples—including a photomontage, a complex illustration, and a text document with multiple type styles—on a scale from 0 (worst) to 5 (best).—**Macworld Lab tests supervised by Mark Hurlow**

All in a Day's Work

All the printers are easy to set up and connect. To keep you apprised of the current print job's status or inform you of any problems, the LaserJet and LaserWriter printers rely solely on traffic-signal–style lights, while all the others have more informative displays that communicate in plain English.

All but the TI microLaser have an optional straight paper path for printing labels, card stock, and (relatively) unwrinkled envelopes. The TI microLaser, on the other hand, is the only printer that comes with two high-capacity paper trays (500 sheets total); contrast this with the single, frustratingly stingy 100-sheet paper tray in the Okidata OL610 and both LaserWriters. Helpfully, the LaserJet 5MP lets you use the manual feed as a second, low-capacity tray for additional paper or envelopes, and the Okidata 810 paper tray features a paper-level indicator.

We encountered serious printing problems with the Lexmark 4039. Straight out of the box, the Lexmark 4039 turns out to be useless for graphics; we had to add extra memory in order to print Macworld Lab's graphics and PostScript-based test pages. (This is due partly to the Lexmark's rock-bottom base RAM configuration and partly to a lack of any sort of memory-optimization technology. Except for the microLaser Pro/8, which uses its own proprietary method, all the other printers come equipped with Adobe Memory Booster.) Even with the added memory, the Lexmark's PostScript emulation was slow and temperamental, and it sometimes refused to print files the other printers handled with no problems.

Overall, paper jams were more common when testing these personal laser printers than with workgroup printers, leading us to conclude that more frequent paper jams may be one of the hidden costs of a less-expensive printer. We also found that fanning the paper stack before placing it in the tray seems to reduce the problem.

The Last Word

With the Lexmark 4039's high scores in quality and the text performance tests, it is tempting to recommend this printer—but we can't. It's too expensive (when the necessary extra memory is added) and too problem-prone and slow in processing PostScript files.

And although their low prices make them good candidates for school and home use, the LaserWriter 300 and Okidata OL610 simply aren't up to snuff for small businesses.

Of the remaining four contenders, our clear favorite is the Hewlett-Packard LaserJet 5MP; this well-designed machine received consistently good marks and performed without a hitch. For small offices, the LaserJet 5MP offers the best combination of price, performance, quality, and trouble-free operation we've seen so far. **m**

Contributing editor ROBERT C. ECKHARDT has recently been studying a completely different page-production technology—pre-Hispanic Mexican painted books.

PERSONAL LASER PRINTERS

Uniformly high-quality text and graphics, reasonably speedy performance, and an affordable price are the hallmarks of a good small-office printer.

★★★★/7.1 **LaserJet 5MP** Dependably high marks throughout Macworld Lab's performance and quality tests, trouble-free operation, and a reasonable price distinguish this printer from the competition. **Company:** Hewlett-Packard (408/246-4300, *http://www.hp.com*). **List price:** $1299.

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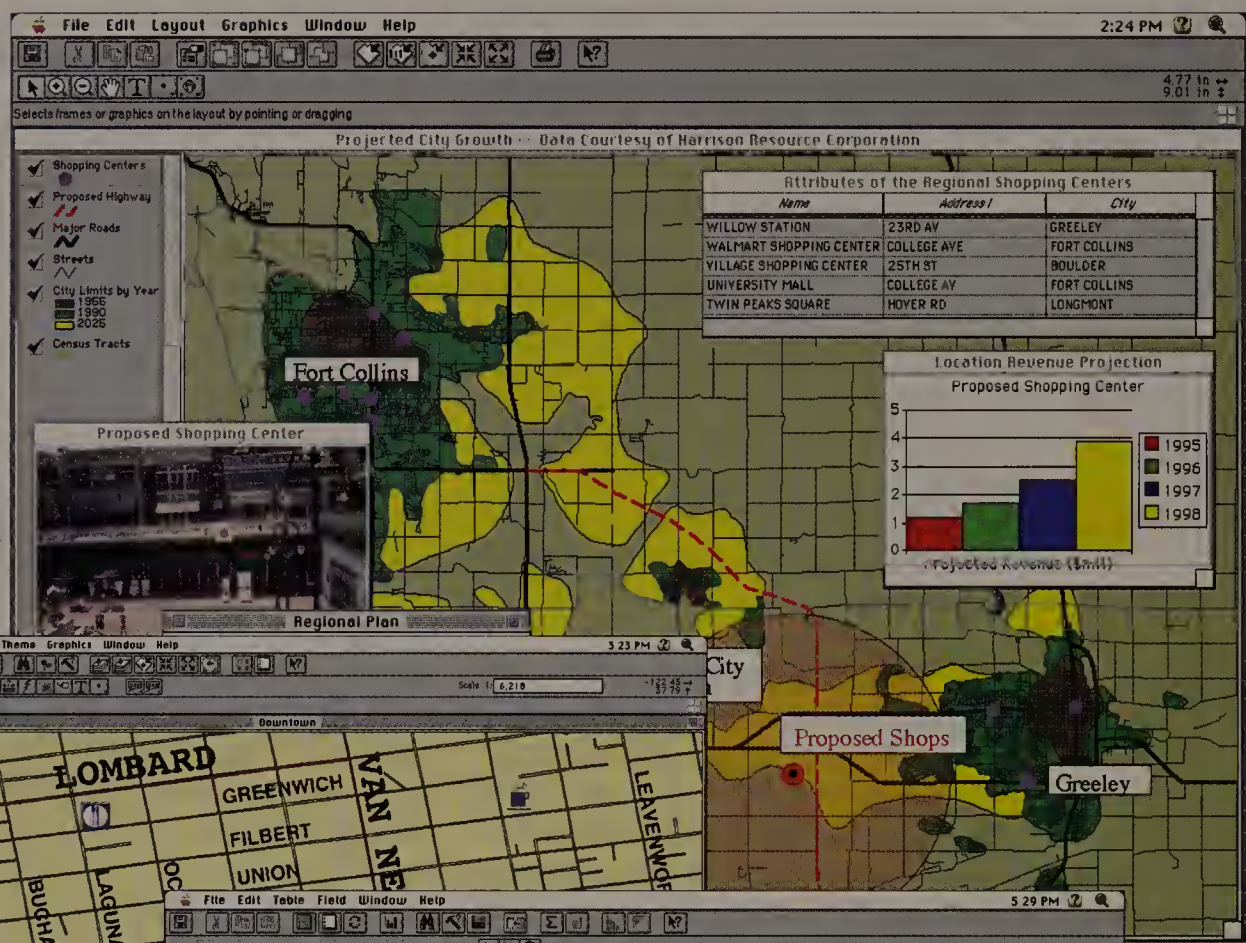
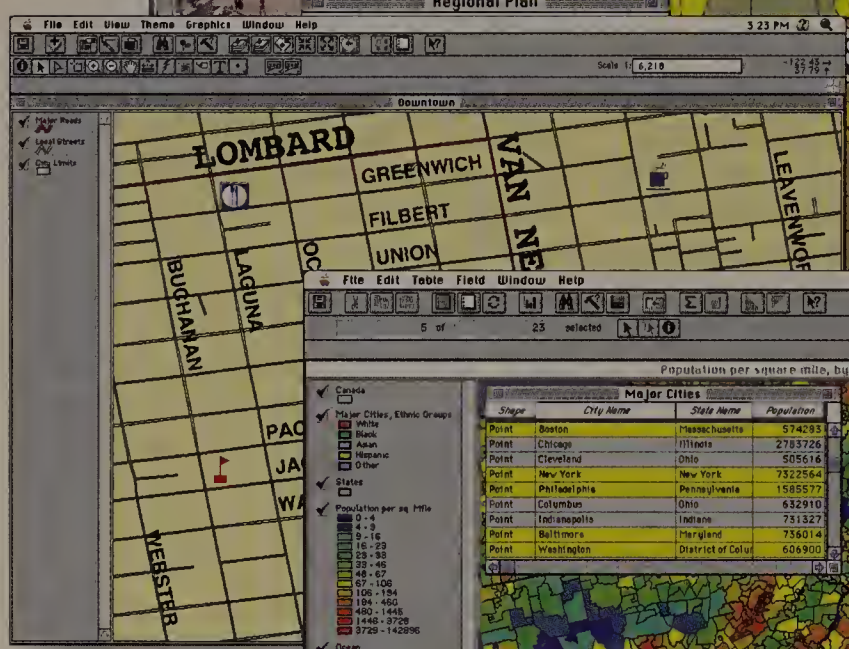
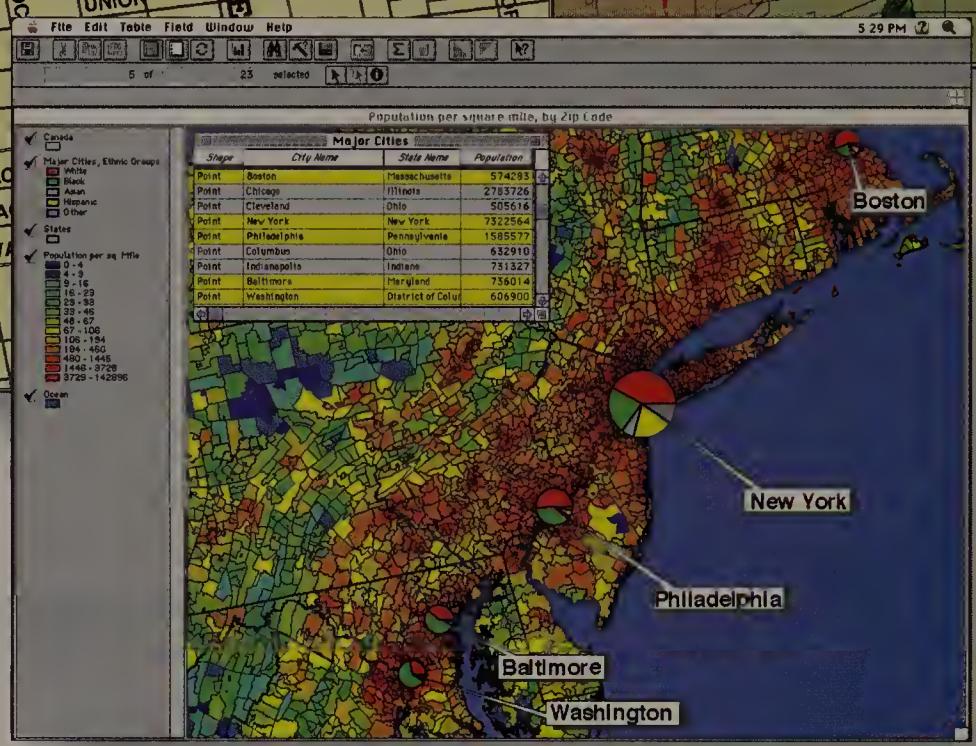




ADDRESS GEOCODING



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Circle 160 on reader service card

by James A. Martin

Spam Isn't Just a Lunch Meat Anymore

HOW TO DEAL WITH ALL YOUR JUNK E-MAIL

"HI," BEGAN THE E-mail message from someone I'd never heard of. "I saw your post on America Online and thought I would drop you a friendly note."

That's nice, I thought. And then my new pen pal got right to the point: "Does your long-distance carrier give you a flat 9.9 cents per minute on your interstate long distance, 24 hours per day, 365 days per year?"

I should have seen that one coming. On an average day, I receive two to five unsolicited, mass-distributed E-mail marketing messages—*spams* they're called in Netspeak. Messages like: "Psychic readings, love spells, dynamic healings, $99. Become that Superman or Superwoman you really are." Or, "Eliminate all your long-distance phone, fax, and cellular phone bills forever!" And my favorite: "Wear our panty hose and make money, too!!"

While these meaty entries from the Spam Hall of Shame might be amusing, the fact that dreck like this regularly arrives in my E-mail in-box isn't terribly funny. It's a good guess that many of the services advertised via junk E-mail are of questionable value to begin with. And there have been reports that some junk E-mails are completely bogus, devised simply to create a backlash against the established companies that the messages appear to represent. The worst of it, though, is that you're charged for the time you spend using online services and the Internet, and it takes time to download, open, read, and/or delete junk mail. Therefore, think of junk E-mail as unsolicited marketing messages that arrive in your mailbox *postage due*.

So where is all this junk E-mail coming from and, more important, what can you do about it? Read on.

How You Get Junk E-mail

America Online and CompuServe don't make E-mail addresses available to outside firms such as direct-mail marketers, according to spokespeople for the services; nor do they accept such messages and route them to their subscribers. Prodigy doesn't sell subscriber E-mail addresses to advertisers, although a Prodigy spokesperson said it will act as the go-between and transmit commercial mail messages (for a fee) to demographically appropriate subscribers.

So how do junk E-mail messages end up in your AOL and CompuServe mail-

boxes? The truth is it's easy for others to capture your E-mail address. Any enterprising soul can record the screen names of AOL subscribers posting messages to a conference or chat room, for instance. Marketers can also easily search an online service's membership directory for, say, all members who live in California and have identified themselves as vintage-car buffs; from that information the marketers can build a highly targeted mailing list.

Anytime you register at (or in some cases, visit) a Web site, you're potentially placing yourself on a junk E-mail list. Also, there are software programs, called sniffers, that can capture any text string with "@" in it—in effect, any address on the Internet. That information is then used to create a mailing list. And if a spammer doesn't want to go to all that trouble, there are plenty of companies that sell lists of E-mail addresses for commercial marketing purposes at astonishingly low rates.

The online services can easily retaliate against a subscriber who sends a mass E-mail posting to other subscribers. Such a practice is against their terms of service, and they can—and do—kick off those who ignore the rules. But when those E-mails come in over the Internet gateway, it's another story.

It's not difficult for AOL, CompuServe, and other services to spot a huge batch of incoming messages to its subscribers, and technically it's possible to block them. But while spamming is considered an Internet abuse, it's not illegal. Current laws prevent marketers from firing off junk faxes and making collect phone calls, but they don't prohibit junk E-mail transmissions. That puts the online services in the position of having to tread carefully when they receive bulk messages over the Internet; blocking E-mail messages could provoke cries of censorship and prevent legitimate, useful messages from getting to subscribers. The result is that, for now at least, junk E-mail will continue to land in your in-box, delivered by way of the Internet gateway.

How to Handle Junk E-mail

The majority of unsolicited messages ask if you want to be removed from the mailing list and tell you how to be taken off

continues

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Bugs and Turkeys

We've noticed that Radius is slow to update software when a new version of the Mac OS is released (see "Bugs & Turkeys," *News*, November 1995). Now owners of Thunder/24 or Spectrum/24 graphics-accelerator cards can write off either their graphics cards or System 7.5.3. Unfortunately, SuperPower 1.1, an extension necessary to use the graphics cards on a Power Mac, is incompatible with System 7.5.3 and Radius has no plans to fix it. Radius, 408/541-6100, *http://www.radius.com*.

You can suppress E-mail solicitations by not posting a user profile, and you can suppress U.S. mail solicitations via keyword *Personal Choices*, but America Online won't let you suppress its own pop-up advertisements. AOL "may offer that option in the future," but for now we're stuck reaching for the mouse and clicking cancel.

Expand a file larger than 127K with Aladdin Systems' StuffIt 4.0 and crash your Mac. This trick works only on the NuBus-equipped Power Mac 6100, 7100, and 8100. *Macworld* staffers also got it to work when stuffing files, though Aladdin Systems couldn't. No word yet on when a fix will be available. Aladdin Systems, 408/761-6200, *http://www.aladdinsys.com*.

Macworld will send you a Bug Report or Turkey Shoot T-shirt if you are the first to inform us of a turkey or a serious, reproducible bug that we report in this column. See How to Contact Macworld.

the list. Typically, it's a matter of creating a new message with the word *remove* in the subject or address field and transmitting it to the sender.

Should your initial request fail, send a message to the postmaster at the sender's E-mail address, requesting that you be removed from their mailing list. But be forewarned: There have been reports of junk E-mailers sending a huge volume of messages to a complainer's E-mail address in retaliation (a practice called *mailbombing*).

If you receive E-mail messages that you find offensive, forward them to your online service or Internet service provider's attention immediately. For America Online, forward the message to *tosemail1* or *tosemail2*; within CompuServe, direct the E-mail message to *csi:ecgintern*; Prodigy members should forward unwanted messages to *mail00b*. At a minimum, you've brought the unwanted message to the online service's attention; if the service gets enough complaints, it'll take action.

Admittedly, downloading or responding to junk E-mail can increase the amount of time spent online. Another solution is simply to blast those messages into oblivion—which is easier with some online services than with others.

AOL doesn't let Macintosh users delete more than one message at a time, for instance—making it a bothersome chore to shed junk mail. Until AOL improves its Macintosh E-mail–handling features, you might consider buying Claris Emailer ($49; 408/987-7000, *http://www.claris.com*). Emailer is a wondrous application that retrieves E-mail from a variety of sources (AOL, CompuServe, Prodigy, the Internet, and others), dumps all the mail into a central in-box, and enables you to erase multiple mes-

Streetwise Shopper

The Digital Chisel 2.1 and Batch It 1.0 Get the multimedia authoring package The Digital Chisel 2.1 (Aug 96 ★★★/6.8 for version 2.0.1c) and Gryphon Software's graphic utility program Batch It 1.0 bundled for $149 while supplies last (suggested retail prices are $159 for Digital Chisel, $199 for Batch It). Pierian Spring Software, 503/222-2044, *http://www.pierian.com*.

Macromedia FreeHand 5.5 Buy Macromedia FreeHand 5.5 (Feb 96 ★★★★/8.1) for $389 or upgrade from version 5.0 for $79 or from any earlier version for $149, and get a Macromedia Special Edition of KPT Vector Effects bundled gratis. Macromedia, 800/472-9025, *http://www.macromedia.com*. Owners of the Vector Effects special edition (which boasts 6 plug-ins) can upgrade to the full version (12 plug-ins) for $79 by calling MetaTools at 805/566-6220 (*http://www.metatools.com*).

sages at once and assign new messages various levels of priority, among other things.

CompuServe, however, lets you delete multiple messages at once. And the next Macintosh version of CompuServe Information Manager (CIM), due out this summer, includes a feature that lets you block any incoming messages from a particular sender. Prodigy users see an asterisk next to any commercial message in their mailbox, which makes it easy to ignore and delete them. Prodigy's new Exclude feature, available in the next Macintosh version, due in August, will also let you block all messages from any sender. An Opt Out feature, which prevents you from receiving any marketing messages in the first place, is also included.

The downside to blocking junk E-mail, of course, is that you may never get any messages offering you the chance to make money while wearing panty hose. But hey, life is full of trade-offs.

Former *Macworld* editor JAMES A. MARTIN writes frequently about the Internet and online services.

THE AMCOEX INDEX OF USED MACINTOSH PRICES

Machine (RAM/Hard Drive)	Average Sale Price	Monthly Change
PowerBook 140 (4MB/40MB)	$550	$0
PowerBook 165 (4MB/80MB)	$750	–$25
PowerBook 180 (4MB/80MB)	$875	–$50
PowerBook Duo 230 (4MB/80MB)	$675	–$25
Mac IIsi (5MB/40MB)	$200	–$50
Mac IIci (4MB/80MB)	$375	+$25
Mac IIfx (4MB/80MB)	$350	–$25
Centris 650 (8MB/230MB)	$675	–$75
Quadra 800 (8MB/230MB)	$1000	–$100
Quadra 900 (8MB/160MB)	$950	$0
Power Mac 7100/80 (8MB/350MB)	$1275	$0
Power Mac 8100AV (8MB/500MB)	$2025	–$100

Index provided by the American Computer Exchange of Atlanta (800/786-0717). It reflects sales during the week of June 20, 1996. Configurations include keyboard and exclude monitor and display board for noncompact models.

Letters

TrackPad Insanity Please help me. Every time I touch the TrackPad of my PowerBook 190cs, the cursor jumps like a horse. The problem, I think, is that I sweat too much—even my fingers. My friends have no problem using my PowerBook's TrackPad. It's driving me insane! As of this moment, I use a lab glove to operate my TrackPad. What else can I do?

KA TAI SHIU
via CompuServe

Poor TrackPad performance due to excessively sweaty digits is a first for us and for most of the vendors we spoke to about your dilemma.

Because touchpads like those in the PowerBooks rely on conductivity to operate, whatever finger-alternate you use has to have the correct capacitance characteristic in order to work, says Macworld's *PowerBook expert, Cary Lu. He suggests plugging in another input device, such as a mouse, when you are using the PowerBook at a desk. When you're on the road, Cary suggests using a knuckle—tiresome in the long run, but probably OK for short-haul work. Stylus pens, for use with graphic tablets, work only with the tablets and not with touchpads, so that option's out.*

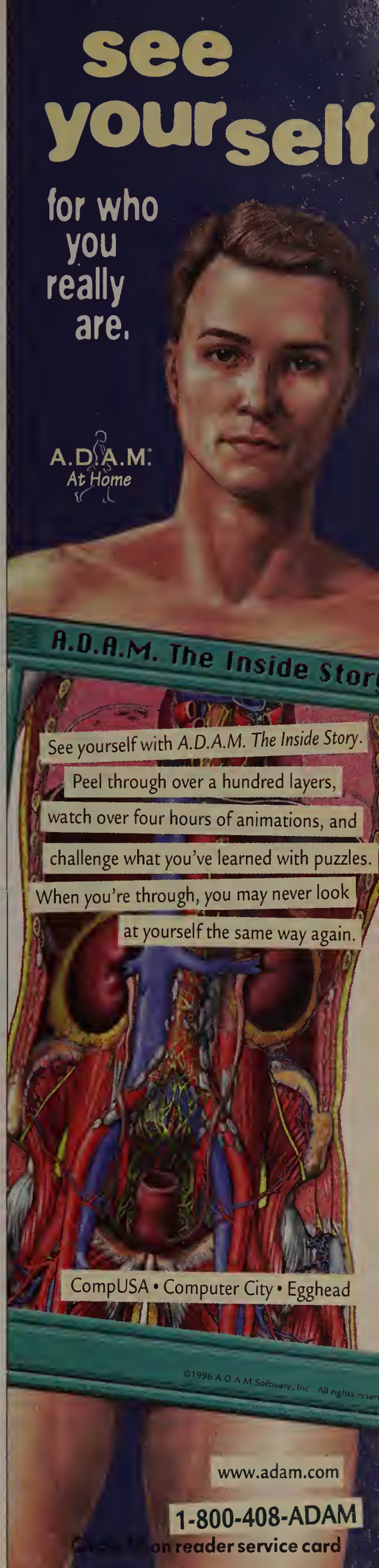
The technical-support staff at Alps Electric thought that ESD (electrostatic device) lotion might help. Workers who assemble boards and other sensitive equipment use this lotion. And if a lab glove works now, try scaling back and using just a single finger cot from the glove on your TrackPad finger. You could also try experimenting with a very thin, self-stick laminate, but be careful not to cut off those important electrical impulses from your fingertips with a substance that is too thick.—SUZANNE COURTEAU AND ROXANNE GENTILE

Service Hero

Ron Cook, of Wagga Wagga, New South Wales, Australia, wrote to draw our attention to something we'd left out of our review of Panorama (*Reviews*, June 1996)—ProVue's friendly service. "They have always answered my questions," he wrote, "and once even sent me a small program to get me out of a tight spot."

Cook was happy that Panorama got covered, though: "Thanks for giving these smaller players space in your magazine. We don't all use just Microsoft or Claris. Your reviewing lesser-known products helps make the Mac community aware of what's out there and thus diversifies the overall market." m

Not getting the treatment you deserve? Or have you received heroic service? Write to the *Consumer Advocate* at *Macworld*, 501 Second St., San Francisco, CA 94107, or send us a fax at 415/442-0766.



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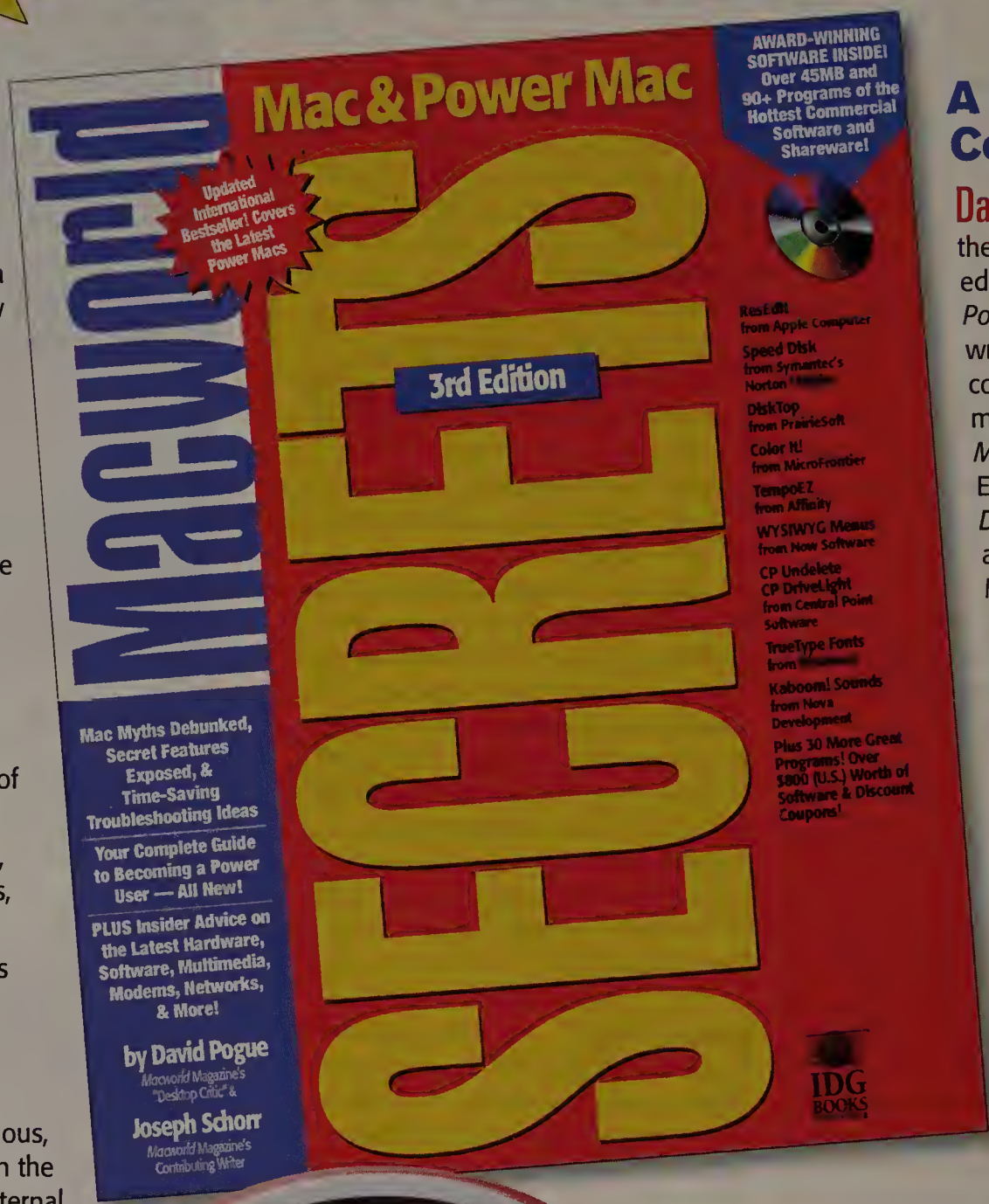

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—Randy Fippinger, New York, NY

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David Pogue co-authored the bestselling previous editions of *Macworld® Mac® & Power Mac™ SECRETS,®* and writes the Desktop Critic column for *Macworld* magazine. He also wrote *Macs® for Dummies,®* 3rd Edition, *MORE Macs® for Dummies,®* and *Hard Drive,* a thriller about the Macintosh.

Joseph Schorr co-authored the 1st, 2nd, and 3rd editions of *Macworld Mac and Power Mac SECRETS.* He is a contributing editor and has recently launched the new SECRETS column in *Macworld* magazine—check it out each month.

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Star Ratings

HARDWARE AND SOFTWARE PRODUCTS AT A GLANCE

Macworld Star Ratings lets you compare Macintosh products based on the authoritative assessments in our reviews and features. The number of stars indicates the product's level of quality; each product also gets a numeric score that provides a more exact assessment of the product's quality within that level. We evaluate seven factors to derive the Star Rating: feature set, design implementation, performance, reliability, ease of use, innovation, and value. We take these evaluations, weight their importance for each class of product, and calculate the final score. The higher the score, the better a product is, even among products with the same number of stars. The following list shows how the ratings and scores relate.

★★★★★	9.0 to 10.0	Outstanding
★★★★	7.0 to 8.9	Very Good
★★★	5.0 to 6.9	Good
★★	3.0 to 4.9	Flawed
★	0.0 to 2.9	Unacceptable

This section also lists products that have been awarded an **Editors' Choice** designation in a *Macworld* product comparison.

If a product has been upgraded since our last assessment, the most recent version number appears in parentheses after the main reviewed version number. To read a full review of any product in the listing, please consult the issue indicated at the end of the listing or search for the product via Macworld Online (keyword *Macworld* on America Online; URL *http://www.macworld.com* on the World Wide Web).

Vendors: Please write to *Macworld Star Ratings*, 501 Second St., San Francisco, CA 94107 to inform us of changes in the version number or list price of your product, or of changes to your phone number.

software

BUSINESS TOOLS

★★★★/8.8 **4th Dimension 3.5**, ACI US, 408/252-4444, $895. Leading Mac database gets important improvements. *Mar 96, p. 60*

★★★★/8.4 **ClarisWorks 4.0**, Claris, 408/727-8227, $129 (estimated). The program's speed, clean design, and low resource requirements put the big boys to shame. *Jun 96, p. 98*

★★★★★/9.7 **Data Desk 5.0**, Data Description, 607/257-1000, $625. Classic statistics program adds dazzling new features. *Mar 96, p. 79*

★★★/6.1 **Mac Manager 3.1**, ELS, 352/375-0558, $79. Desktop security takes on a Copland-style look, complete with a few ragged edges. *May 96, p. 78*

★★/4.4 **MapLinx 3.0**, MapLinx, 214/231-1400, $149.95. Useful tool if you only need to see where your customers are located. *Apr 96, p. 82*

★★/4.6 **McAfee VirusScan**, McAfee Associates, 408/988-3832, $65. Virus-detection package falls short on features compared with other commercial competitors. *May 96, p. 74*

★★★★/7.1 **Microsoft Excel 5.0**, Microsoft, 206/882-8080, $295 (estimated). Although it's the only game in town for number-crunching professionals, Excel 5 is a glutton for RAM and disk space. *Jun 96, p. 98*

★★★★/7.1 **PhonePro 3.0**, Cypress Research, 408/752-2700, $349. Telephony standard improves programming, sound handling. *Jul 96, p. 72*

★★★★/7.7 **QuickBooks Pro 4.0**, Intuit, 415/944-6000, $189. Can be customized for your business; Business Library and some Windows features not included. *Jun 96, p. 55*

★★★★/8.3 **Quicken Deluxe 6**, Intuit, 520/295-3220, $59.99. The best-selling package gets bigger and mostly better. *Feb 96, p. 65*

★★/4.9 **WealthBuilder 4.01**, Reality Online, 610/277-7600, $49.95. This financial planner doesn't quite add up. *May 96, p. 74*

COMMUNICATIONS/NETWORKS

★★★/6.5 **BBEdit 3.52**, Bare Bones Software, 508/651-3561, $119. This Web-authoring tool targets power users. *Jun 96, p. 61*

★★★★/8.0 **CommuniGate 1.0**, Stalker Software, 415/383-7164, free for 5 users; 25 users $200; unlimited users $600; gateway modules $100 each. CommuniGate lets you send mail, faxes, print jobs, and electronic pages. *Apr 96, p. 63*

★★/4.6 **COPSTalk for Windows 1.2f**, CoOperative Printing Solutions, 770/840-0810, $179 per user. Windows 95–compatible software gives PCs AppleTalk capability. *Mar 96, p. 67*

★★★/5.8 **CU-SeeMe 1.0**, White Pine Software, 603/886-9050, freeware. Great for avoiding long-distance phone charges, but Internet is poor vehicle for video transmission. *May 96, p. 82*

★★★★/7.4 **DragNet 1.03**, OnBase Technology, 714/830-5682, $39.95. DragNet helps you sort and categorize Internet addresses. *May 96, p. 52*

★/1.4 **httpd4Mac 13b**, Bill Melotti, free. Minimalist freeware: feature-poor and unreliable Mac Web server. *Apr 96, p. 86*

★★★/5.2 **InterServer Publisher 1.0.1**, Intercon, 703/709-5500, $795. Fast and functional, but missing key features and documentation. *Apr 96, p. 86*

★★/3.1 **LANScape SNMP 2.1**, Sonic Systems, 408/736-1900, $799. SNMP console sports some sophisticated features, but its interface, basic features, and documention need work. *Jul 96, p. 74*

★★★/6.4 **LANsurveyor 3.0**, Neon Software, 510/283-9771, 5 zones, $395; unlimited zones, $695. LANsurveyor maps and monitors your AppleTalk network. *May 96, p. 70*

★★★/6.3 **MachTen 4.0**, Tenon, 805/963-6983, $695. Fast but hard to use, requiring Unix administration skills. *Apr 96, p. 86*

★★/4.0 **MacHTTP 2.2**, Quarterdeck/StarNine, 510/649-4949, $95. Capable Mac Web server shareware but unreliable under heavy load. *Apr 96, p. 86*

★★★/5.0 **MailKeeper 1.0.2**, Nisus Software, 619/481-1477, $35. Quick online information database could be more convenient. *Apr 96, p. 70*

★★★★/7.4 **Navigator 2.0**, Netscape Communications, 415/528-2555, $49 without manual, $69 with manual. Netscape pushed beyond Web browsing. *May 96, p. 50*

★★★★/7.3 **NetMeter 1.0**, AG Group, 510/937-7900, $395. Keep tabs on your Ethernet network via sights and sounds. *Jun 96, p. 73*

★★★★/7.8 **NetPresenz 4.0**, Stairways Shareware, no phone, $10 (shareware). Internet server on a shoestring. *May 96, p. 55*

★★★/5.1 **NewsHopper 1.2**, LandWare, 201/347-0031, $59. Well-equipped Usenet news reader's competition is free. *Aug 96, p. 69*

★★★/6.9 **PageMill 1.0**, Adobe Systems, 415/961-4400, $149. Drag-and-drop Web publishing software masks HTML complexities. *Mar 96, p. 56*

★★★★/8.8 **PageNow 1.5**, Mark/Space Softworks, 408/293-7299, $119. Alphanumeric paging software gets the message across. *Mar 96, p. 70*

★★★/5.8 **Personal MacLAN Connect 5.51**, Miramar Systems, 805/966-2432, $199 per user. Windows 95–compatible software lets PC and Mac users communicate via AppleTalk. *Mar 96, p. 67*

★★★/6.5 **SiteMill 1.0.2**, Adobe Systems, 415/961-4400, $595. Simple Web-site manager is welcome but incomplete. *Jul 96, p. 67*

★★★★/7.3 **StreamWorks 1.0**, Xing Technology, 805/473-0145, free. Netscape plug-in delivers CD-quality audio; no Mac server available. *Jul 96, p. 92*

★★★★/7.2 **Talker 2.0**, MVP Solutions, *http://www.mvpsolutions.com*, free. Netscape plug-in uses no more bandwidth than text does, but won't shut up until you go to another Web page. *Jul 96, p. 92*

★★★★/7.2 **TeleFinder 5.0**, Spider Island, 714/453-8095, $675. BBS software that understands the Net. *Aug 96, p. 65*

★★★/5.5 **Timbuktu Pro for Networks 2.0**, Farallon, 510/814-5000, single user $139; 2-user pack $189; *continues*

Star Ratings

100-user pack $3999. Remote control and file-sharing standby gets a ho-hum upgrade. *May 96, p. 68*

★★★★/7.3 **Voyager 1.0,** Virtus, 919/467-9700, free. VRML browser lets you view 3-D Web sites, but navigation tools are nonintuitive. *Jul 96, p. 92*

★★★★/7.3 **WebStar 1.2.1,** Quarterdeck/StarNine, 510/649-4949, $795. Polished, capable, reliable, easy-to-use, and reasonably fast Mac Web server. *Apr 96, p. 86.* **Editors' Choice** for best Web server software.

DESKTOP PUBLISHING

★★★★/7.2 **FontMonger 1.5.7,** Ares Software, 415/578-9090, $149.95. Easy font modifications, from redrawing characters to converting font formats. *Apr 96, p. 102*

★★★★/7.0 **PageTools 2.0,** Extensis, 503/274-2020, $99.95. Plug-ins add power and precision to PageMaker. *May 96, p. 65*

★★★★/7.4 **theTypeBook 4.02b,** Rascal Software, 805/255-6823, $49.95. Creates font reference books from ready-to-print specimen pages. *Apr 96, p. 102*

★★★/5.3 **UniQorn 1.01,** SoftPress Systems Limited, 415/331-4820, $895. Page-layout program has QuickDraw GX support—but not much else. *Aug 96, p. 56*

★★/4.0 **WorldWrite 3.0,** WorldSoft, 801/350-9490, $149. New word processor is promising but nothing to write home about. *Aug 96, p. 73*

★★★/5.1 **Xdream 1.0,** Vision's Edge, 904/386-4573, $149. Single Quark XTension comprises 24 tools ranging from useful to indispensable. *Jun 96, p. 50*

★★★★/7.1 **XPert Tools 1.0,** XChange, 970/229-0620, $99 per volume, $169 for both. If you need to go beyond Quark's feature set, XPert Tools will take you there. *Jun 96, p. 50*

EDUCATION/ENTERTAINMENT

★★★★/8.1 **Alien Tales,** Brøderbund, 415/382-4700, $45. Brøderbund enlivens classic literature for kids. *Jun 96, p. 56*

★★★/6.8 **The Amazing Writing Machine,** Brøderbund, 415/382-4700, $45 CD, $35 floppy. Creative writing with a spin. *Jun 96, p. 56*

★★★/6.8 **Bartlett's Familiar Quotations 1.0,** Time Warner, 212/522-0680, $39.95. CD-ROM proves you *can* teach an old reference new tricks. *Aug 96, p. 82*

★★★★/8.6 **The Cartoon Guide to Physics,** HarperCollins Interactive, 212/207-7000, $49.95. Entertaining introduction to basic kinematics. *Apr 96, p. 78*

★★★/6.2 **Cliffs StudyWare for Algebra 1.0,** Cliffs Notes, 402/423-5050, $49.95. Algebra tutorial makes poor use of multimedia. *Jul 96, p. 76*

★★★★/7.1 **College Advisor,** Princeton Review Publishing, 617/272-7027, $19.95. Help with one of life's big choices. *Aug 96, p. 84*

★★★★/7.2 **Connections,** Discovery Channel Multimedia, 301/986-0444, $49.95. Ideas and entertainment link up in this puzzle/adventure game based on the PBS series. *Aug 96, p. 88*

★★★★/8.5 **Descent 1.0,** MacPlay, 714/553-3530, $49.95. Which way is up? 360-degree 3-D maneuverability will leave you spinning. *Apr 96, p. 72*

★★★/6.9 **Fun With Electronics,** Philips Media, 310/444-6500, $44.99. Multimedia updates a hobby-shop classic. *May 96, p. 80*

★★★★/8.8 **In the 1st Degree,** Brøderbund, 415/382-4700, $49.95. Realistic, interactive legal thriller. *Apr 96, p. 80*

★★/4.1 **Juilliard Music Adventure,** Theatrix Interactive, 510/658-2800, $34.95. Kids' music package misses the mark. *Aug 96, p. 75*

★★/4.4 **Learn the Art of Magic,** Brøderbund, 415/382-4700, $35. Lots of tricks, but on-camera magician is unbearably irritating. *May 96, p. 62*

★★★/5.6 **Learn to Speak Spanish 6.0,** The Learning Company, 510/792-2101, $109. Comprehensive, but doesn't adapt to your needs or progress. *May 96, p. 60*

★★★/5.8 **Life's Greatest Mysteries,** A.D.A.M. Software, 770/980-0888, $39.95. CD-ROM explains imponderables for the medically curious. *Jun 96, p. 75*

★★★/5.3 **A Little Kidmusic,** Ars Nova, 206/828-2711, $75. Short on theory, long on entertainment. *Aug 96, p. 75*

★★★★/8.5 **Logical Journey of the Zoombinis 1.0,** Brøderbund, 415/382-4400, $40. A different kind of math program, helping kids develop logical thinking skills without manipulating any numbers. *Jul 96, p. 78*

★★★★/7.0 **Magic: An Insider's View,** HarperCollins Interactive, 212/207-7000, $39.95. Superb on-camera magician, stale between-trick segments. *May 96, p. 62*

★★★★/8.5 **Marathon 2: Durandal,** Bungie Software Products, 312/563-6200, $79. A well-crafted action-adventure game, but it's not for the squeamish or those disturbed by violence. *Mar 96, p. 85*

★/2.8 **Meet MediaBand 1.0,** Canter Technology, 415/387-0400, $49.95. A poorly executed collection of artwork and music masquerading as a game. *Jul 96, p. 64*

★★/3.9 **Rebel Assault II,** LucasArts Entertainment, 415/472-3400, $54.95. *Star Wars*–inspired game handicapped by minimal game play. *Jun 96, p. 63*

★★★★/7.5 **RedShift 2,** Maris Multimedia, 415/492-2819, $54.95. RedShift 2 lets you explore space from any planet. *May 96, p. 71*

★★★/6.2 **Spanish Native Guide 1.0,** Native Guide Software, 415/802-8085, $49.95. Adapts to your progress, but pronunciation help is missing. *May 96, p. 60*

★★★/5.3 **Spanish Now 4.0,** Transparent Language, 603/465-2230, $129. Engaging approach, but poor documentation and confusing interface. *May 96, p. 60*

★★★/6.6 **Table Magic,** Arc Media, 416/410-4429, $19.95. Few tricks, but the ones that are here are original. *May 96, p. 62*

★★★/5.3 **Total Distortion 1.0,** Pop Rocket, 415/242-2158, $39.95. A labored mix of interactivity and music videos. *Jul 96, p. 64*

★★★★/8.3 **X-Wing Collector's CD-ROM,** LucasArts Entertainment, 415/472-3400, $59.95. The learning curve is steep, but X-Wing delivers action-packed adventure. *Jun 96, p. 63*

★★★★/8.9 **You Don't Know Jack,** Berkeley Systems, 510/540-5535, $30. "Jeopardy!" with a bad attitude. *Mar 96, p. 85*

GRAPHICS

★★/4.9 **3D World 1.0,** Microspot USA, 408/253-2000, $139. Affordable but limited QuickDraw 3D design tool. *Jul 96, p. 74*

★★★★/8.4 **Adobe After Effects 3.0,** Adobe Systems, 415/961-4400, $995 base version; $1995 Production Bundle. Must-have video-design package enhances motion control and adds effects. *Mar 96, p. 54*

★★★★/7.1 **Adobe Illustrator 6.0,** Adobe Systems, 415/961-4400, $595. Don't let the version number fool you: this is a minor upgrade. Its minor tweaks aren't enough to surpass FreeHand 5.5. *Apr 96, p. 54*

★★★/6.3 **Adobe PhotoDeluxe 1.0,** Adobe Systems, 415/961-4400, $129. "Photoshop Lite" makes questionable compromises in order to appeal to consumer market. *Apr 96, p. 59*

★★★★/8.5 **Adobe Photoshop 3.0.5,** Adobe Systems, 415/961-4400, $895. Remains the single most significant and capable image editor, but its imperfections and omissions leave some artists searching for alternatives. *Jun 96, p. 78*

★★★★/7.4 **Adobe Premiere 4.2,** Adobe Systems, 415/961-4400, $795. Video editor offers significant enhancements, including CD-ROM Movie Maker plug-in. *Mar 96, p. 90*

★★★/6.9 **Boris Effects 1.01,** Artel Software, 617/566-0870, Premiere version $350; Media 100 version $695. Plug-in for Premiere and Media 100 adds video-effects control. *Feb 96, p. 85*

★★★★/7.7 **Bryce 2,** MetaTools, 805/566-6200, $299. Create awe-inspiring, photorealistic 3-D landscapes. *Aug 96, p. 59*

★/1.5 **Chagall 2.0.2,** Technosystems USA, 502/351-0108, $299. Image-editing application flunks test. *Feb 96, p. 78*

★★★★/8.0 **Claris Impact 2.0,** Claris, 408/987-7000, $99. Easy and affordable business-graphics software. *Feb 96, p. 66*

★★★★/7.5 **Dabbler 2,** Fractal Design, 408/688-5300, $69. Drawing package offers an easy, affordable natural painting option. *Mar 96, p. 63*

★★★★/7.3 **DrawTools 1.0,** Extensis, 503/274-2020, $149. Extensions add color, shape, and object tools to FreeHand and Illustrator. *Feb 96, p. 71*

★★/4.5 **Envelopes 1.0,** Letraset USA, 800/343-8973, $99. Distorts objects but inserts extraneous anchor points as well *Mar 96, p. 106*

★★★★/7.7 **Extreme 3D 1.0,** Macromedia, 415/252-2000, $699. Precise modeling controls—as long as you can live without inverse kinematics, special-effects plug-ins, and QuickDraw 3D support. *Jul 96, p. 60*

★★★★/8.3 **Final Effects AP 1.0,** MetaTools, 805/566-6200, $199. Add cool video effects to Adobe Premiere. *Aug 96, p. 86*

★★/3.3 **Infinite FX 1.0,** BeInfinite, 404/552-6624, $149. Many automated reshaping effects, mired by poor organization. *Mar 96, p. 106*

★★★★/8.3 **Kai's Power Tools 3.0,** MetaTools, 805/566-6200, $199. More-powerful plug-ins, more-baffling interface. *Feb 96, p. 57*

★★★/6.9 **KPT Cool Effects 1.0,** MetaTools, 805/566-6200, $29. "Kai's Power Tools Lite" at a bargain price. *Aug 96, p. 88*

★★★★/8.9 **KPT Final Effects 3.0,** MetaTools, 805/566-6200, $695. Superb effects library for Adobe After Effects. *Apr 96, p. 69*

★★★/6.2 **LightningDraw GX 1.0,** Lari Software, 919/968-0701, $299. Lets you combine colors and shapes and experiment with QuickDraw GX fonts. *Mar 96, p. 106*

★★★★/7.2 **Live Picture 2.5,** Live Picture, 408/464-4200, $995. Lacks support for the blend modes and numerical focus controls and can only edit the topmost visible layer, but is superfast and its core tech-

nology remains as superior as ever. *Jun 96, p. 78*

★★★★/8.1 **Macromedia FreeHand 5.5,** Macromedia, 415/252-2000, $595. Draw program outperforms competitor, for now. *Feb 96, p. 74*

★★★★/8.5 **MapArt Cartographic Data Bank 1.0,** Cartesia Software, 609/397-1611, $249 per volume, $399 for both. Detailed, editable maps spice up your layouts. *May 96, p. 72*

★★★★/7.8 **MapArt Designer Series 1.0,** Cartesia Software, 609/397-1611, $129 per volume, $199 for both. Detailed, editable maps spice up your layouts. *May 96, p. 72*

★★★★/8.1 **MiniCad 6,** Graphsoft, 410/290-5114, $795. Nothing's small about this modular package. *Mar 96, p. 65*

★★★★/8.9 **Painter 4.0,** Fractal Design, 408/688-5300, $549. Painter 4.0 is the program most artists should own; its painting and special-effects capabilities simply can't be beat. *Jun 96, p. 78*

★★★★/7.2 **QX-Tools 1.0,** Extensis, 503/274-2020, $149. Ten XTensions that make QuarkXPress more powerful. *Feb 96, p. 73*

★★★/6.9 **Ray Dream Studio 1.0,** Ray Dream, 415/960-0765, $499. These 3-D design tools are competent and affordable. *May 96, p. 58*

★★★★/8.7 **SmartSketch 1.0,** FutureWave Software, 619/637-6190, $69.95. Makes drawing and editing paths as easy as painting. *Mar 96, p. 106.* **Editors' Choice** for best natural draw programs.

★★★/6.5 **theFONDler 4.0.1,** Rascal Software, 805/255-6823, $69.95. Font utility diagnoses problems. *Apr 96, p. 84*

★★★★/8.7 **upFront 2.0.1,** SketchTech, 612/379-1435, $299. A new vendor—SketchTech—improves Alias's venerable entry-level 3-D modeling package. *Mar 96, p. 86*

★★★/6.3 **xRes 2.0,** Macromedia, 415/252-2000, $799. Although considerably improved, fast, and easy to learn, this image editor still leaves room for improvement. *Jun 96, p. 78*

MATH/SCIENCE

★★★★/7.5 **Igor Pro 2.0.4,** WaveMetrics, 503/620-3001, $495. Top-notch scientific graphing package. *Feb 96, p. 90*

★★★★/8.4 **JMP In 1.0,** Duxbury Press, 800/354-9706 (U.S. only), $54. Student version of stats heavyweight sets the standard. *Jul 96, p. 79*

★★★★/7.7 **LabView 4.0,** National Instruments, 512/794-0100, $1995. The biggest and best in lab software keeps growing. *Aug 96, p. 67*

★★★★/7.2 **Minitab 10 Xtra,** Minitab, 814/238-3280, $895. Updated package offers a complete statistical tool kit. *Jun 96, p. 66*

★★★★/7.4 **Spreadware Statistics Menu 4.0,** Spreadware, 619/772-1758, $229. Excel users can put Spreadware's statistics to work in minutes. *Apr 96, p. 72*

★★★★/7.1 **SPSS 6.1,** SPSS, 312/329-2400, $695; modules $395 to $495. Mainframe statistics giant has new Mac interface. *Feb 96, p. 82*

★★★★/8.3 **StatView 4.5,** Abacus Concepts, 510/540-1949, $595. Statistics and graphing package. *Feb 96, p. 81*

ORGANIZATION/PRODUCTIVITY

★★★/5.1 **ACT for Macintosh 2.5.1,** Symantec, 541/334-6054, $169.95. A weak offering in the field of contact-management and scheduling software where you don't have to compromise. *Jul 96, p. 62*

continues

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Star Ratings

★★/4.8 **ACT for Newton 1.0,** Symantec, 541/334-6054, $99.95. Only die-hard fans of the desktop version could love this portable PIM. *Jul 96, p. 62*

★★★/6.8 **Claris Organizer 1.0,** Claris, 408/987-7000, $49 (estimated). This simple little PIM is fast, easy to learn, and intelligently designed. *Jun 96, p. 106*

★★★/6.9 **Cumulus 2.5,** Canto Software, 415/905-0300, $1795. Turn your multimedia archives into a network image database. *Aug 96, p. 55*

★★★/6.9 **DateBook Pro 4.2,** Now Software, 503/274-2800, $69.95 (estimated). A well-designed but often sluggish calendar and scheduling program. *Jun 96, p. 106*

★★/3.7 **Day-Timer Organizer 2.0,** Day-Timer Technologies, 415/572-6260, $59.95. PIM has some rough edges. *Mar 96, p. 92*

★★★/5.2 **Full Contact 3.0,** Pitch Software, 408/374-5504, $199. Resurrected PIM has been improved—but not enough. *Jun 96, p. 70*

★★★★/7.0 **In Control 4.0,** Attain, 617/776-1110, $85. Outline-based PIM adds net links. *Aug 96, p. 63*

★★★/6.9 **InTouch 2.5.2,** Prairie Group, 515/225-3720, $49.95. A simple contact manager that doesn't force you to plug information into designated slots. *Jun 96, p. 106*

★★★/5.4 **KeyQuencer,** available online, shareware. Relatively powerful shareware macro program is inexpensive, but doesn't allow you to record macros. *Jun 96, p. 106*

★★★/6.9 **Micro Planner Manager 1.4,** Micro Planning International, 303/757-2216, $695. Project-management application takes scheduling seriously. *Jun 96, p. 65*

★★★★/7.4 **QuicKeys 3.0.1,** CE Software, 515/221-1801, $119. The hands-down winner for an easy way to automate repetitive tasks using macros. *Jun 96, p. 106*

★★★/6.9 **Tempo II Plus 3.0.9,** Affinity Microsystems, 303/442-4840, $179.95. Powerful macro program suffers from undue complexity and an awkward interface. *Jun 96, p. 106*

★★★/6.8 **TouchBase Pro 4.2,** Now Software, 503/274-2800, $69.95 (estimated). Slow, but offers up to 16 custom fields. *Jun 96, p. 106*

★★/3.7 **Tropix 2.0.5,** Alaras, 919/544-1228, $4990. Tropix tames chaotic image files—but not always successfully. *Aug 96, p. 55*

★★★★/7.1 **WebArranger 2.0,** CE Software, 515/221-1801, $99.95. Resurrected PIM offers strong suite of Internet tools. *Aug 96, p. 63*

PRESENTATION TOOLS

★★★★/7.1 **Apple Media Tool 2.0,** Apple Computer, 408/996-1010, $495. Easy for simple interactivity, but advanced features require add-on products. *Aug 96, p. 100*

★★★★/7.1 **Astound 2.0,** Gold Disk, 408/982-0200, $249. Presentation graphics with a multimedia twist. *Mar 96, p. 73*

★★★★/7.1 **Authorware 3.5,** Macromedia, 415/252-2000, $4995. Authorware offers great features and usability but is very costly. *Aug 96, p. 100*

★★★★/7.1 **Deck II 2.5,** Macromedia, 415/252-2000, $399. Deck II widens its lead over other software-only multitrack programs. *Jun 96, p. 52*

★★/3.9 **Digital Box Office 1.0,** PowerProduction Software, 310/937-4411, $599. Combines object- and timeline-oriented authoring, but has an awkward user interface. *Aug 96, p. 100*

★★★/6.8 **The Digital Chisel 2.0.1c,** Pierian Springs Software, 503/222-2044, $99. Strong student-tracking features, but a poor Undo command. *Aug 96, p. 100*

★★★★/7.2 **Director 5.0,** Macromedia, 415/252-2000, $1195. Multimedia authoring tool gets polish and a performance boost. *Jul 96, p. 52.* **Editors' Choice** for best authoring programs. *Aug 96, p. 100*

★★★★/7.0 **HyperStudio 3.1,** Roger Wagner Publishing, 619/442-0522, $199.95. Easy and powerful but lacks strong student-tracking options. *Aug 96, p. 100*

★★/3.5 **Mediagnügen 1.0.1,** Gnügen Software, 303/682-5380, $29.98. Almost useless as a serious browser; you can view and copy collections of images but not organize and sort them. *Apr 96, p. 67*

★★★/6.9 **Microsoft PowerPoint 4,** Microsoft, 206/882-8080, $295 (estimated). A solid, simple-to-use slide machine. *Jun 96, p. 98*

★★★/6.5 **Movie Cleaner Pro 1.1.1,** Terran Interactive, 408/353-8859, $129. QuickTime-compression utility for crisp CD-ROM movies. *Apr 96, p. 69*

★★★★/7.0 **mTropolis 1.0,** mFactory, 415/548-0600, $4995. Fast and easy to implement most interactivity; but limited text support, and it's expensive. *Aug 96, p. 100*

★★★/6.8 **Oracle Media Objects 1.0.5.4,** Oracle, 415/506-7000, $495. Good interface and multiplatform support, but requires too much scripting. *Aug 96, p. 100*

★★★/6.9 **Peak 1.02,** Bias, 415/331-2446, $299. Digital-audio program combines versatility and power. *Aug 96, p. 60*

★★★/6.4 **Persuasion 3.0,** Adobe Systems, 206/470-7000, $259 (estimated). Hard to use, but offers every presentation effect a pro could need. *Jun 96, p. 98*

★★/4.0 **ProView 1.1 (1.2),** E-magine, 818/881-4757, $99.95. Adequate tool for assembling an electronic portfolio or online manual. *Apr 96, p. 67*

★★★★/7.0 **SoundEdit 16 2.0,** Macromedia, 415/252-2000, $399. The premier Mac sound-editing program just gets better. *Jun 96, p. 52*

★★★★/7.0 **Special Delivery 2.1,** Interactive Media, 415/948-0745, $259. Easy to use, but lacks hypertext. *Aug 96, p. 100.* **Editors' Choice** for best authoring software.

★★/4.9 **STiP Professional 2.1,** MacVonk, 403/232-6545, $1295. Multimedia authoring program is promising but flawed. *Apr 96, p. 75*

★★★★/7.1 **SuperCard 2.5.2,** Allegiant Technologies, 619/587-0500, $595. Superb resource-management and interface support, but can be sluggish. *Aug 96, p. 100.* **Editors' Choice** for best authoring software.

PROGRAMMING

★★★★/8.4 **CodeWarrior Gold 7,** Metrowerks, 512/305-0400, $399. Key Power Mac compiler gets yet another face-lift. *Mar 96, p. 69*

★★★/6.9 **FutureBASIC II,** Staz Software, 601/255-7085, $229. Complete friendly BASIC programming environment but no Power Mac support and some problems with numerics. *Jul 96, p. 81*

★★★★/8.0 **LS FORTRAN 1.1,** Fortner Research, 703/478-0181, $695. FORTRAN rides again, running science programs on the Power Mac desktop. *Feb 96, p. 95*

★★★/6.4 **PowerBuilder 4.0,** Powersoft, 508/287-1500, $3295. Cross-platform development tool comes to the Mac at last. *Aug 96, p. 71*

★★★★/7.0 **Roaster DR1,** Natural Intelligence, 617/876-7680, $299. Fast Java compiler, but some compatibility problems with Sun's Java standard. *Jul 96, p. 92*

★★★★/8.4 **Scripter 1.0.1,** Main Event Software, 202/298-9595, $199. AppleScript development system offers serious debugging power. *Mar 96, p. 88*

★★★★/7.0 **Tools Plus 2.6,** Water's Edge Software, 416/219-5628. For Symantec's C/C++ and Pascal, $149 each; for both, $199; for CodeWarrior Bronze, $199; for CodeWarrior Gold, $249. Programmers' tool kit saves time. *Feb 96, p. 92*

★★★★/8.0 **VIP C 2.0,** Mainstay, 805/484-9400, $495. Impressive update of slick coding tool. *Jul 96, p. 80*

★★★/6.6 **Visual C++ 4.0 Cross-Development Edition,** Microsoft, 800/426-9400, $1999. Program in Windows, port effortlessly to the Mac. *Jul 96, p. 71*

UTILITIES

★★★★/7.3 **Adobe Fetch 1.2,** Adobe Systems, 415/961-4400, $149. Catalog graphics, text, and more for easy organization and retrieval. *Apr 96, p. 102*

★★★/5.3 **Adobe File Utilities 1.0,** Adobe Systems, 415/961-4400, $149. Macintosh utilities work well but are unnecessary for many Mac users. *Aug 96, p. 62*

★★★★/8.7 **Adobe Type Manager 3.9,** Adobe Systems, 415/961-4400, $39.95. Accurately renders PostScript fonts at all sizes on screen and on any printer. *Apr 96, p. 102*

★★★★/7.3 **AliasZoo 2.0.5,** Blue Globe Software, shareware, $15. Locates and fixes orphaned aliases and deletes unneeded ones. *Apr 96, p. 102*

★★★/6.9 **Anubis 2.54,** CharisMac Engineering, 916/885-4420, $129.95. Disk formatter is reliable, easy to use. *May 96, p. 76*

★★★★★/9.3 **AreaCodeFinder 4.0,** John Calande, shareware, $15. Identifies the location (and time zone) of a telephone area code and vice versa. *Apr 96, p. 102*

★★★★/7.3 **Calc+ 2.0,** Abbott Systems, 914/747-4201, $29. Simple calculator has a resizable, scrollable, editable, printable tape. *Apr 96, p. 102*

★★★/5.7 **Captivate 4.5,** Mainstay, 805/484-9400, $89.95. Screen grabber fumbles but survives. *Jun 96, p. 74*

★★/3.8 **CD AutoCache 1.1,** CharisMac Engineering, 916/885-4420, $79.95. Offers nice interface, but is buggy and provides minimal performance boost. *Jun 96, p. 62*

★★★/5.4 **CD-ROM ToolKit 2.0.1,** FWB Software, 415/325-4392, $79. Offers attractive interface and reliable performance, but is RAM-hungry with minimal performance boost. *Jun 96, p. 62*

★★★★/7.6 **DeBabelizer 1.6.5,** Equilibrium Technologies, 415/332-4343, $399. Endlessly talented and exasperating batch processor for bitmap graphics. *Apr 96, p. 102*

★★★★/8.6 **Desktop Dialer 1.4.2,** Sophisticated Circuits, 206/485-7979, $75. Dials phone numbers appearing in any document. *Apr 96, p. 102*

★★★★/7.8 **DiskExpress II 2.20,** Alsoft, 713/353-4090, $89.95. Intelligently defragments hard drives for optimum drive performance. *Apr 96, p. 102*

★★★/6.8 **DOS Mounter 95 1.0,** Software Architects, 206/487-0122, $100. Windows-to-Mac file-transfer utility gets Win 95–savvy. *Mar 96, p. 74*

★★★★/8.1 **DragStrip 2.0,** Natural Intelligence, 617/

876-7680, $59.95. Feature-packed file launcher well worth the premium price. *Apr 96, p. 102*

★★★★/8.3 **Exodus 5.2.1,** White Pine Software, 603/886-9050, $295. All around, the best for price/performance and X protocol support. *May 96, p. 108.* **Editors' Choice** for best X Window server software.

★★★/6.7 **GrabNet 2.0,** ForeFront Group, 713/961-1101, $19.95. Bookmark manager for Netscape Navigator grabs Web graphics and text. *Apr 96, p. 102*

★★★★/7.6 **MacLinkPlus/Translators Pro 8.06ia,** DataViz, 203/268-0030, $149. Excellent PC to Mac (or reverse) conversions for word processor, spreadsheet, or database documents. *Apr 96, p. 102*

★★★/6.7 **MacTools Pro 4.0,** Symantec, 541/334-6054, $149.95. A respectable troubleshooting and data-recovery program for a reasonable price. *Jun 96, p. 106*

★★★/6.7 **MacX 1.5,** Apple Computer, 408/996-1010, $295. Window server software offers acceptable performance, but it's not the leader in the category. *May 96, p. 108*

★★★/6.8 **Norton Utilities 3.2,** Symantec, 541/334-6054, $149.95. An easy-to-use tool kit that works wonders on bad disks, corrupted files, and crashed hard drives. *Jun 96, p. 106*

★★★/6.4 **Now Utilities 6.0,** Now Software, 503/274-2800, $89.95. A good collection of utilities, but a mediocre upgrade. *Aug 96, p. 59*

★★★★/7.1 **OmniPage Pro 6.0,** Caere, 408/395-7000, $699. Flagged-text feature is indispensable and handles gray-scale graphics. *Jun 96, p. 54*

★★★/5.1 **OneClick 1.0.1,** Westcode, 619/487-9200, $129. Promising button-based macro utility needs fine-tuning. *May 96, p. 67*

★★★★/7.1 **OptiMem RAM Charger 2.12,** Jump Development Group, 412/681-2692, $129. Increases RAM available for applications by allocating it more efficiently. *Apr 96, p. 102*

★★★★/8.3 **PopupFolder 2.0.1,** Inline Software, 617/938-8088, $79. Improves Finder navigation via ubiquitous pop-up menus. *Apr 96, p. 102*

★★★★/8.6 **RAM Doubler 1.6,** Connectix, 415/571-5100, $99. Fools your Mac into thinking it has twice the RAM it actually does. *Apr 96, p. 102*

★★★★/8.9 **Retrospect 3.0; Retrospect Remote 3.0,** Dantz Development, 510/253-3000. Retrospect, $249; Retrospect Remote (10 users), $449. Backup programs now even more powerful, easier to use. *Apr 96, p. 61*

★★★/5.7 **SAM 4.0.8,** Symantec, 541/334-6054, $69. SAM finds viruses, kills 'em. *Jul 96, p. 72*

★★★★/8.9 **Speed Doubler 1.0.2,** Connectix, 415/571-5100, $99. Connectix makes a Power Mac's 680X0 emulation feel native. *Feb 96, p. 56*

★★★★/7.9 **StuffIt Deluxe 3.5,** Aladdin Software, 408/761-6200, $129.95. Macintosh, PC, and Internet file compression and decompression. *Apr 96, p. 102*

★★★★/8.9 **SuperATM 3.9,** Adobe Systems, 415/961-4400, $69. ATM's PostScript font rendering plus intelligent substitution of missing fonts. *Apr 96, p. 102*

★★★★/7.0 **TextBridge Pro 3.0,** Xerox, 508/977-2000, $349. Supports graphics, but does not flag unrecognized text. *Jun 96, p. 54*

★★★★/7.2 **Transverter Pro 3.0.1,** TechPool Software, 216/291-1922, $399. Batch-process PostScript files or preview them to catch mistakes before printing. *Apr 96, p. 102*

★★★★/8.5 **TypeTamer 1.1.1,** Impossible Software, 714/470-4800, $59.95. Every conceivable Font

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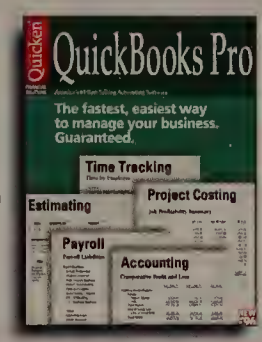

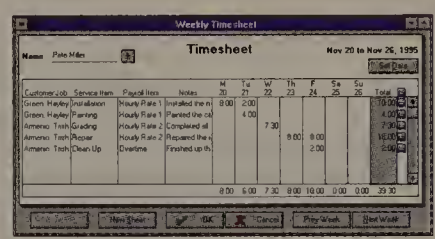

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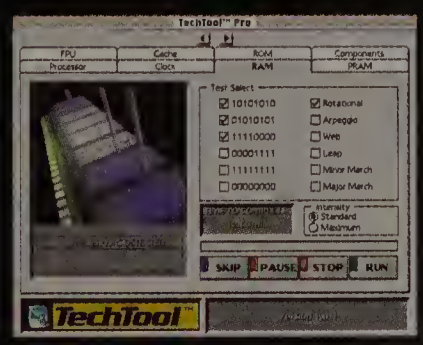

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menu improvement in one well-designed program. *Apr 96, p. 102*

★★★/6.5 **XoftWare for MacOS 3.0,** NetManage, 619/755-3998, $295. X Window server software taken from Apple's MacX code, XoftWare turns in similar performance at a similar price. *May 96, p. 108*

★★★★/8.1 **XTen 6.0,** Tenon Intersystems, 805/963-6983, $350. A speed demon, but be sure you're willing to be a Unix guru before choosing it. *May 96, p. 108.* **Editors' Choice** for best X Window server software.

VERTICAL MARKETS

★★★★/8.1 **Finale 3.5.1,** Coda Music Technology, 612/937-9611, $545. Music-notation software goes Power Mac native. *May 96, p. 81*

★★★/6.9 **Quicken Family Lawyer 6.0b,** Parsons Technology, 319/395-9626, $49. Helps you prepare 61 legal documents. *Feb 96, p. 88*

★★★★/8.1 **WillMaker 6.0,** Nolo Press, 510/549-1976, $69.95. Commonsense legal guide makes writing your will easy. *Aug 96, p. 80*

WRITING TOOLS

★★★/6.9 **Dramatica Writer's Dream Kit 1.7,** Screenplay Systems, 818/843-6557, $149. Powerful writer-assistance software refines your fiction. *Aug 96, p. 83*

★★/3.0 **Indexicon 1.0,** Iconovex, 612/896-5100, $129. Word 6 indexing tool has trouble identifying indexable terms. *Apr 96, p. 77*

★★★/6.7 **Microsoft Word 5.1,** Microsoft, 206/882-8080, $320 (estimated). Fast, sleek, stable, and probably the most widely used Mac word processor on earth. *Jun 96, p. 98*

★★★/5.1 **Microsoft Word 6.0.1,** Microsoft, 206/882-8080, $295 (estimated). Word 6, the most bloated word processor on earth, may be mandatory in big corporations. *Jun 96, p. 98*

★★★★/7.4 **WordPerfect 3.5,** Corel, 613/728-8200, $129 (estimated). In speed, interface efficiency, and Macintosh integration, WordPerfect beats all competitors. *Jun 96, p. 98*

hardware

INPUT DEVICES

★★/4.7 **Adjustable Keyboard,** Apple Computer, 408/996-1010, $119. Adjustable split keyboard, but with small function keys. *May 96, p. 98*

★★★/6.1 **BAT Personal Keyboard,** Infogrip, 805/652-0770, $199. Chording device takes time to learn. *May 96, p. 98*

★★★/6.0 **Comfort Keyboard,** Health Care Keyboard, 414/536-2160, $795. Expensive keyboard has separate sections that adjust independently. *May 96, p. 98*

★★★/5.8 **DataHand,** DataHand Systems, 602/860-8584, $995. Costly, but requires much less arm and hand motion than other text-input devices. *May 96, p. 98*

★★★/6.0 **Desktop GlidePoint,** Alps Electric, 408/432-6000, $99.95. Average touchpad whose biggest selling points are adjustable base and edge-detection. *May 96, p. 98*

★★★/6.0 **GlidePoint Desktop,** Cirque, 801/467-1100, $99.95. Similar to Alps input device, but without detachable base. *May 96, p. 98*

★★★/5.3 **GyroPoint Desk 1.0,** Gyration, 408/255-3016, $149. Mouse works on or off the desk. *Jul 96, p. 76*

★★★/5.2 **MacTrac Deluxe,** MicroSpeed, 510/490-1403, $99. Good, basic trackball. *May 96, p. 98*

★★★/5.6 **Microsoft Natural Keyboard,** Microsoft, 800/426-9400, $99.95. Inexpensive split keyboard with integrated wrist rest. *May 96, p. 98*

★★★/5.1 **Mouse Pen Mac 3.0,** Fellowes, 708/893-1600, $39.99. Versatile, inexpensive penlike pointing device. *May 96, p. 98*

★★★/6.2 **Mouse-Trak,** Itac Systems, 214/494-3073, $179. Well-built trackball with good ball dynamics. *May 96, p. 98.* **Editors' Choice** for best input devices.

★★★/5.0 **PenDirect ADB,** FTG Data Systems, 714/995-3900, $398. PenDirect controls cursor on monitors, but with less precision than touch screen. *May 96, p. 98*

★★/4.4 **PointPad,** Hagiwara Sys-Com, 619/546-9989, $89. Responds to direct pressure but awkward for dragging. *May 96, p. 98*

★★★/6.4 **RemotePoint,** Interlink Electronics, 805/484-1331, $159.95. Wireless pointer works well for stand-up presentations. *May 96, p. 98*

★★★★/7.4 **Thinking Mouse 5.0,** Kensington Microware, 415/572-2700, $89.99. Four-button mouse with excellent software. *May 96, p. 98.* **Editors' Choice** for best input devices.

★★/4.3 **TouchPad,** Touché Technologies, 415/331-6622, $59.95. This touchpad suffers from small buttons that can't be customized. *May 96, p. 98*

★★★/6.7 **Tru-Form,** Adesso, 213/294-4300, $89-$99. Good split keyboard design with integrated pointing device. *May 96, p. 98*

MISCELLANEOUS HARDWARE

★★/4.0 **Brother MFC 4000ML,** Brother, 908/356-8880, $1000 plus $89 for Mac interface. Fax-copier-printer's top-notch fax features are marred by touchy printing. *May 96, p. 69*

★★★/6.4 **Chinon ES-3000,** Chinon America, 310/533-0274, $1095. Digital camera zooms in but with the high price doesn't measure up to Kodak Digital Camera 40's. *Mar 96, p. 77*

★★★★/7.8 **Polaroid PDC-2000,** Polaroid, 716/256-4436 ext. 868, $3695 as tested. New breed of camera creates output as cool as its hardware. *Aug 96, p. 52*

★★★/5.9 **Sony PC Cam,** Sony Electronics, 941/731-4940, $499. This desktop camera lacks AV strength; its competitor—VideoLabs' FlexCam—is simply the better camera. *Apr 96, p. 77*

MODEMS/NETWORK HARDWARE

★★★/6.3 **28.8 CruiseCard,** Megahertz, 801/320-7000, $299. Economical PC Card modem with good performance but low connect (reliability) rates. *Jul 96, p. 141*

★★★/6.9 **3Com Impact,** 3Com, 408/764-5000, $549. This ISDN terminal adapter features easy-to-use installation software. *May 96, p. 54*

★★★★/7.7 **BitSurfr Pro,** Motorola, 205/430-8000, $495. This ISDN terminal adapter offers a good value. *May 96, p. 54*

★★/4.8 **Communicard 28.8,** Dayna Communications, 801/269-7200, $416, $359 without cellular capability (estimated prices). Expensive PC Card modem, without digital line protection frequently found in similar cards. *Jul 96, p. 141*

★★/4.6 **Courier I-Modem with ISDN/V.34,** U.S. Robotics, 847/676-7010, $895. This ISDN terminal adapter is expensive and lacks features. *May 96, p. 54*

★★★/6.0 **DF2814,** TDK Systems, 916/478-8421, $379. Although boosted by low price and a 5-year warranty, the PC Card modem was bogged down by JPEG file transfer. *Jul 96, p. 141*

★★★/5.4 **EFM 288XJ,** Epson America, 310/782-0770, $299. In our tests it's a fast PC Card modem, but with a low call-connect (reliability) score. *Jul 96, p. 141*

★★★/6.2 **MacClass 288 V.34,** Practical Peripherals, 770/840-9966, $299. PC Card modem has acceptable performance with a nice price and a lifetime warranty. *Jul 96, p. 141*

★★★/5.4 **Mobile Plus Macintosh,** Apex Data, 510/623-1231, $307. PC Card modem has a long, five-year warranty, but not much else to recommend it. *Jul 96, p. 141*

★★★/6.6 **Optima 288 V.34,** Hayes Microcomputer Products, 770/441-1617, $319. PC Card modem is an excellent performer with a great price and warranty. *Jul 96, p. 141*

★★★★/8.0 **PowerPort Platinum PC Card,** Global Village Communication, 408/523-1000, $399. A complete, well-conceived mobile communications package for the Macintosh. *Jul 96, p. 141.* **Editors' Choice** for best PC Card modems.

★★★/5.4 **SafeJack,** Angia Communications, 801/371-0488, $299. Lifetime warranty for this PC Card modem, but no bundled software. *Jul 96, p. 141*

★/2.6 **Smart One 2834VLXMac,** Best Data Products, 818/773-9600, $269. This voice modem is not a smart choice. *Jun 96, p. 76*

★★/4.3 **SmartLink V.34 2834 PCA,** Archtek America, 818/912-9800, $349. PC Card modem has no Mac documentation. *Jul 96, p. 141*

★★★★/8.2 **TribeLink2,** Tribe Computer Works, 510/814-3900, $1295; dial-out option $200; additional PPP client licenses $145 for 10 users to $1495 for 500. Two-port remote-access server features Web-based administration. *Apr 96, p. 62*

PRINTERS

★★★/5.2 **1060E,** QMS, 334/633-4300, $2399. Average quality, but supplies only available from QMS. *Jun 96, p. 116*

★★★/5.3 **1660E,** QMS, 334/633-4300, $3999. Average quality printer that does not print envelopes. *Jun 96, p. 116*

★★★/5.6 **4520mp,** Xerox, 716/442-4028, $4070. Slightly above average speed and quality, and comes with three input trays. *Jun 96, p. 116*

★★★/5.7 **Accel-a-Writer 8200,** Xanté, 334/476-8189, $4495. Can handle large paper and offers halftone calibration, but output quality only average. *Jun 96, p. 116*

★★★/6.9 **Apple Color StyleWriter 1500,** Apple Computer, 408/996-1010, $289. Low-cost color ink-jet offers a bargain-priced option for the casual user. *Jul 96, p. 59*

★★★★/7.2 **Apple Color StyleWriter 2400,** Apple Computer, 408/996-1010, $429. Very good print quality at a reasonable price. *Apr 96, p. 133.* **Editors' Choice** for best midrange color ink-jet printers.

★★★★/7.5 **Apple Color StyleWriter 2500,** Apple Computer, 408/996-1010, $389. Color ink-jet has quality and speed that small-office users will find

valuable. *Jul 96, p. 59*

★★★★/7.1 **Canon BJC-4100**, Canon Computer Systems, 714/438-3000, $399. Excellent print quality and can be used with a PC. *Apr 96, p. 133.* **Editors' Choice** for best midrange color ink-jet printers.

★★★★/7.2 **Epson Stylus Pro**, Epson America, 310/782-0770, $999. Top-notch 720-dpi output, sprightly performance; a bargain alternative to dye-sub printers. *Apr 96, p. 133.* **Editors' Choice** for best high-end color ink-jet printers.

★★/3.9 **FS-1600A**, Kyocera, 908/560-3400, $2495. This inexpensive printer is slow and offers poor print quality. *Jun 96, p. 116*

★★/4.1 **FS-3600A**, Kyocera, 908/560-3400, $4278. Good paper-handling options, but slow for graphics and offers poor print quality. *Jun 96, p. 116*

★★★/5.1 **HP Color LaserJet 5M**, Hewlett-Packard, 800/752-0900, $9195. HP loses on all counts to the Tektronix Phaser 550. *Jun 96, p. 51*

★★★/5.2 **HP LaserJet 4M Plus**, Hewlett-Packard, 408/246-4300, $2479. Good print quality, but below average speed. *Jun 96, p. 116*

★★★/6.0 **HP LaserJet 4MV**, Hewlett-Packard, 408/246-4300, $3459. Strong tabloid size printer with good speed and adequate print qualtiy. *Jun 96, p. 116*

★★★/5.9 **HP LaserJet 5M**, Hewlett-Packard, 408/246-4300, $2229. A good workgroup printer gets better. *Jul 96, p. 56*

★★★/6.5 **HP LaserJet 5Si MX**, Hewlett-Packard, 408/246-4300, $4899. Pricey, but offers top speed and quality. *Jun 96, p. 116.* **Editors' Choice** for best workgroup printers.

★★★/5.7 **LaserWriter 16/600 PS**, Apple Computer, 408/996-1010, $1950 (estimated). Good performance at a modest price, but lacks some convenience features. *Jun 96, p. 116*

★★/3.3 **microLaser PowerPro/12**, Texas Instruments, 817/774-6000, $1998. Inexpensive, but offers poor output quality and very slow Photoshop printing. *Jun 96, p. 116*

★★★/5.8 **Optra Lx+**, Lexmark, 606/232-2000, $3249. Good print quality and paper handling are offset by slow speed for graphics. *Jun 96, p. 116*

★★★★/7.9 **Tektronix Phaser 550**, Tektronix, 503/682-7377, $6995. The Phaser 550 beats HP Color LaserJet 5M on speed, resolution, and price. *Jun 96, p. 51*

★★★/5.3 **Typhoon 16**, Dataproducts, 805/578-4000, $3699. Solid printer, especially for mixed-platform environment; average output quality. *Jun 96, p. 116*

SCANNERS

★★★/5.1 **Apple Color OneScanner 600/27**, Apple Computer, 408/996-1010, $629. New version of the Color OneScanner has little to offer. *Jul 96, p. 54*

★★/3.3 **Color OneScanner**, Apple Computer, 408/996-1010, $859. The Color OneScanner's anemic software bundle and lackluster performance would make it an unexceptional offer even if reasonably priced. *Mar 96, p. 118*

★★★/5.4 **EasyPhoto Reader**, Storm Software, 415/691-6600, $259. Small-format photo scanner has its limits. *May 96, p. 66*

★★★★/7.2 **ES-1200C**, Epson, 310/782-0770, $1299. The ES-1200C scanner has great image quality, respectable speed, and good software, all at a reasonable price. *Mar 96, p. 118.* **Editors' Choice** for best midrange scanners.

★★★★/7.1 **Gemini D-16**, Umax, 510/651-4000,

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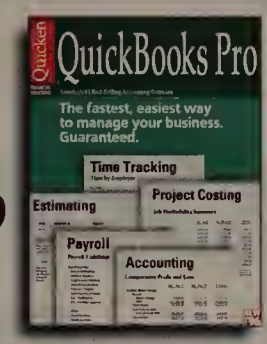

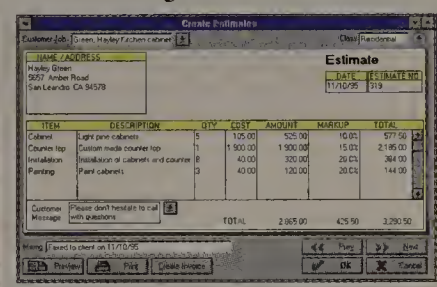

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$1895–$1995. The Gemini D-16 is unique in being both a 400-dpi and 800-dpi scanner, depending on the scanning area, but for several hundred dollars above its competitors, you'd better need that extra resolution. *Mar 96, p. 118*

★★★/6.3 **HP ScanJet 4p,** Hewlett-Packard, 408/246-4300, $615. High price and slow scan times make the ScanJet 4p scanner a mediocre choice. *Jul 96, p. 54*

★★/3.8 **IX-4015,** Canon, 714/438-3000, $799. Boasts desk-space economy and an exceptional warranty, but its performance and software bundle are mediocre. *Mar 96, p. 118*

★★★/6.9 **Mac IRISPen,** Image Recognition Integrated Systems, 407/395-7831, $299. Portable, accurate pen OCR scanner. *Apr 96, p. 75*

★★★/6.6 **PageOffice,** Umax Technologies, 510/651-4000, $349. Personal page scanner shortchanges Mac users. *Jun 96, p. 58*

★★★★★/9.6 **PaperPort Vx,** Visioneer, 415/493-9599, $369. Desktop document scanner just gets bettter. *Mar 96, p. 82*

★★/4.0 **Paragon 1200SP,** Mustek, 714/250-8855, $899-$1000. The Paragon 1200SP is a disappointment, from its performance to its bare-bones manual. Proof that a 600-dpi, 30-bit scanner for $899 isn't a bargain. *Mar 96, p. 118*

★★★/5.0 **ScanMaker IIsp,** Microtek, 310/297-5000, $499–$699 (street). The ScanMaker IIsp is a shaky performer at best, especially when it comes to capturing highlight detail (it doesn't), but it's an option for the bargain hunter. *Mar 96, p. 118*

★★★/5.8 **ScanTouch AX-1200,** Nikon, 516/547-4355, $1720. The ScanTouch AX-1200 is a solid performer, but at this price it should be closer to stunning. *Mar 96, p. 118*

★★★/5.6 **Silverscanner III,** La Cie, 503/520-9000, $1499–$1699. The Silverscanner III is a good performer in many respects, but its poor color accuracy and high price place it behind the Epson ES-1200C on which it's based. *Mar 96, p. 118*

★★★/5.9 **StudioScan IIsi,** Agfa, 508/658-5600, $900 (street). The StudioScan IIsi gets good performance from its 30-bit, 400-dpi engine. Agfa's software is powerful and flexible, but could be easier to use. *Mar 96, p. 118*

★★★★/8.4 **Umax Vista-S6E,** Umax Technologies, 510/651-4000, $445. Despite its low price, the Vista-S6E is a clear best buy for anyone seeking a quality desktop scanner. *Jul 96, p. 54*

★★/3.8 **VIP Scan,** La Cie, 503/520-9000, $199. Scans automatically to contact manager; includes Now Contact; uses nonstandard SCSI connector. *Apr 96, p. 64*

SPEAKERS

★★★★/8.8 **Acoustimass,** Bose, 508/879-7330, $699. Full, rich, natural sound; treble slightly rolled off but clean. *Mar 96, p. 157.* **Editors' Choice** for best three-piece speakers.

★★★★/7.1 **ACS 52,** Altec Lansing, 717/296-2818, $128. Clean, reasonably solid presentation; crisp highs; powerful bass for such a small design. *Mar 96, p. 157*

★★★★/7.1 **AMX-16,** Radio Shack, 817/390-3300, $120 (street). Clean, reasonably crisp, slightly bright, decent bass, somewhat lacking in low-end heft. *Mar 96, p. 157*

★★★/6.8 **AppleDesign Powered Speakers,** Apple Computer, 408/996-1010, $179. Clean, reasonably solid presentation. Bass is good but doesn't shake the foundations. *Mar 96, p. 157*

★★/4.9 **AV270 Powered Speakers,** Advent, 708/317-3700, $179. Clean and smooth. Somewhat tinny quality to midrange and highs. *Mar 96, p. 157*

★★★/6.2 **AV622 Powered Speakers,** Advent, 708/317-3700, $299. Clean and smooth, with some-what lightweight character. Slight treble emphasis. Bass has reasonable weight and impact. *Mar 96, p. 157*

★★★/5.2 **J-688AV,** Jazz, 818/336-2689, $149. Reasonably smooth sound, noticeably rolled-off high end, slightly harsh midrange becomes a bit fatiguing over a long listening session. *Mar 96, p. 157*

★★/4.7 **J-902,** Jazz, 818/336-2689, $150. Clear reproduction, with moderate bass emphasis and overemphasized treble. Generally thin sonic character because of the high-frequency emphasis. *Mar 96, p. 157*

★★★/5.8 **JPS 45,** Jensen, 708/317-3700, $149. Clean, reasonably crisp, slightly bright; an almost sandpapery affect on cymbals; adequate bass, somewhat lacking in low-end heft. *Mar 96, p. 157*

★★/3.5 **Labtec LCS-3210,** Labtec, 360/896-2000, $119 (street). Decent, slightly boomy bass, harsh midrange, rolled-off treble. Sound gets harsher when played at loud volumes. *Mar 96, p. 157*

★★★/6.2 **MA-12CP,** Roland, 213/685-5141, $319. Relatively warm, well-balanced sound; slightly lightweight bass. Tends to sound harsh when played at normal volume levels. *Mar 96, p. 157*

★★★★/7.8 **MediaMate,** Bose, 508/879-7330, $339. Full, warm, rich, natural sound. Cymbals had considerable clarity and detail and sounded realistic. Amazingly robust for such a small speaker. *Mar 96, p. 157.* **Editors' Choice** for best desktop speakers.

★★★/6.6 **MLi-95,** Midi Land, 909/592-1168, $120. Surprisingly good sound for the money. Clean, reasonably clear; fine musical details a wee bit indistinct, good voice reproduction, adequate bass. Smooth highs, accurate presentation. *Mar 96, p. 157*

★★★★/7.5 **MMS 557,** Audio-Technica, 216/686-2600, $150. Relatively clean, slightly bright, crisp sound. Surprisingly robust bass for a small box. *Mar 96, p. 157*

★★★★/7.9 **SoundWorks,** Cambridge SoundWorks, 617/332-5936, $220. Clean, well-balanced sound, slight upper midrange emphasis, good bass. *Mar 96, p. 157.* **Editors' Choice** for best low-end three-piece speakers.

★★★/5.7 **SurroundSound ACS 500,** Altec Lansing, 717/296-2818, $450. Robust sound, slightly smeared highs, and slight harshness when played at loud volume. Bass is powerful, but a bit boomy. *Mar 96, p. 157*

★★/3.7 **SW150,** Koss, 414/964-5000, $180. Weak bass, harsh midrange, rolled-off treble. No saving graces. *Mar 96, p. 157*

★★★/6.4 **TC1490-7SUB,** Multimedia Labs, 410/429-4300, $249. Clean sound and thin balance; adjusting subwoofer output just makes bass boom, but bass is always lightweight. *Mar 96, p. 157*

★★★/6.4 **YST-SS1010,** Yamaha, 714/522-9240, $350. Relatively warm, well-balanced sound, slightly rolled-off treble with slight smearing effect on cymbals, average bass impact with subwoofer. Tends to sound harsh when played at loud volume levels. *Mar 96, p. 157*

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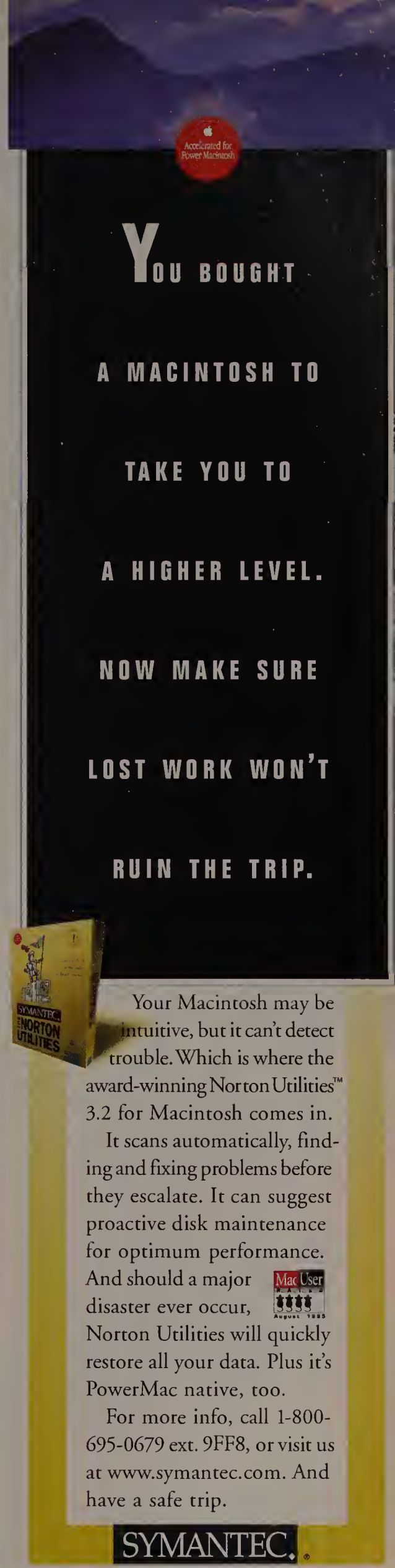

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Star Ratings

SYSTEMS/STORAGE

★★/4.9 **3200**, Seagate, 714/252-7800, $339. The price is right, but this drive unfortunately uses the noisy, slow Travan technology that requires expensive media. *Aug 96, p. 143*

★★★/5.1 **50 1GQ Series**, Liberty Systems, 408/983-1127, $699. Only its compact size and speed recommend this 1.1GB drive. *Jun 96, p. 153*

★★★/5.4 **50 2.1GQ Series**, Liberty Systems, 408/983-1127, $1099. 2.1GB drive offers good speed, good price, skimpy manual. *Jun 96, p. 153*

★★★/6.0 **Advantage 2000**, MicroNet Technology, 714/453-6100, $1080. 2.1GB drive is a top performer with a too-short warranty. *Jun 96, p. 153*

★★★/6.3 **Apple MessagePad 120**, Apple Computer, 408/996-1010, $699. Good software support and handwriting recognition help make this the best PDA. *Jul 96, p. 102*

★★★/6.0 **APS MS 2.0**, APS Technologies, 816/483-1600, $800. 2.1GB drive's good performance is enhanced by an excellent manual and software bundle. *Jun 96, p. 153*

★★★/6.4 **Blue Storm 2000**, Microtech, 203/468-6223, $2882. Expensive, but 2.4GB drive's strong performance and stackability help offset that. *Jun 96, p. 153*

★★/4.3 **Blue Stream DAT**, Microtech, 203/468-6223, $1399. DAT system has average performance, average price. *Aug 96, p. 143*

★★/4.6 **DAT 8-OSSD**, DynaTek, 902/832-3000, $1099. A disappointment among DAT drives for both its price and performance. *Aug 96, p. 143*

★★★★/7.4 **DC DLT 4000**, Direct Connections, 612/937-9771, $3495. The top performer among DLT drives in price, performance, and warranty. *Aug 96, p. 143.* Editors' Choice for best tape-backup system.

★★★/6.6 **DC SDT 7000**, Direct Connections, 612/937-9771, $999. The top performer in DAT drives for performance, price, and warranty. *Aug 96, p. 143.* Editors' Choice for best tape-backup system.

★★★/5.5 **DCM 1200**, Direct Connections, 612/937-6283, $322. A decent performer, this 1.2GB drive offers a five-year warranty and a low price. *Jun 96, p. 153*

★★/3.6 **DCM 2400**, Direct Connections, 612/937-6283, $685. A slow performer, this 2.4GB drive also has ungainly ergonomics. *Jun 96, p. 153*

★★★/6.5 **DLT30**, APS Technologies, 816/483-6100, $4000. A top performer in the DLT field, though priced higher than other DLT devices. *Aug 96, p. 143*

★★/4.4 **EXB-8505XL**, Exabyte, 303/442-4333, $1595. A disappointing performance from an internal 8mm drive with higher capacity than DAT and less than DLT. *Aug 96, p. 143*

★★/4.9 **EXB-8700**, Exabyte, 303/442-4333, $1995. A disappointing performance from an external 8mm drive with higher capacity than DAT and less than DLT. *Aug 96, p. 143*

★★★★/7.0 **Genesis MP 528**, DayStar Digital, 707/967-2077, $9999. If you do extensive Photoshop work every day, and the Photoshop tasks you do benefit from the four CPUs, this system is worth its high price. *Jul 96, p. 84*

★★★/6.7 **Hammer PE 2000**, FWB, 415/325-4392, $1079. For the fastest performance, the Hammer PE 2000 is the choice. *Jun 96, p. 153.* Editors' Choice for best 1.0GB to 2.5GB hard drive.

★★/4.7 **HammerDAT 8000**, FWB, 415/325-4392, $1429. A middling performer among the DAT drives tested. *Aug 96, p. 143*

★★★/5.9 **HammerDLT 20G**, FWB, 415/325-4392, $5999. A top performer in both large-file and large-folder backup, this DLT system is hampered by its high price. *Aug 96, p. 143*

★★★/5.9 **HyperDAT Pro**, APS Technologies, 816/483-6100, $1100. Uses the same mechanism as the Editors' Choice in this round-up, but this DAT system is more expensive. *Aug 96, p. 143*

★★★★/8.3 **Jaz Drive**, Iomega, 801/778-1000, $599.95. Iomega thinks big with Zip's new sibling. *Jun 96, p. 48*

★★★/5.2 **LanCD 3.2**, Logicraft, 603/880-0300, $695 for 10 users. Network CD-ROM client software suffers from difficult setup. *Aug 96, p. 76*

★★/4.6 **Mac 2616 QWCX**, MegaHaus, 713/534-3919, $469. This relatively inexpensive tape-backup system is based on the Travan mechanism, which is noisy, slow, and requires expensive media. *Aug 96, p. 143*

★★★/5.5 **Mac 8 616HPX**, MegaHaus, 713/534-3919, $1079. The least-expensive DAT drive in our roundup, with average performance results. *Aug 96, p. 143*

★★/4.2 **MagicLink PiC-2000**, Sony, 408/432-1600, $899. PDA has readable screen, with a built-in modem and great communications software; but too large, and few software titles available. *Jul 96, p. 102*

★★★/5.2 **Magic Seagate Barracuda**, MacProducts USA, 512/892-4070, $1006. More expensive than MacProducts' almost-as-fast, same-capacity (2.1GB) Hawk drive. *Jun 96, p. 153*

★★★/5.6 **Magic Seagate Hawk**, MacProducts USA, 512/892-4070, $858. Pass-through power connector and a nice warranty distinguish this 2.1GB drive. *Jun 96, p. 153*

★★★★/7.0 **MessagePad 130**, Apple Computer, 408/996-1010, $695. Apple adds backlighting to the Newton. *Aug 96, p. 78*

★★★/5.3 **MiniPak 2100**, Optima Technology, 714/476-0515, $975. 2.1GB drive is inexpensive but only a poor-to-average performer. *Jun 96, p. 153*

★★★★/7.3 **Nupowr for PowerBook 500 series**, Newer Technology, 316/943-0222, $745 with no RAM, $975 with 4MB, $1215 with 8MB. Solid path to PowerPC for 500-series notebooks. *Aug 96, p. 54*

★★/3.4 **PD DAT 4000**, ProDirect, 612/941-1805, $900. A little on the slow side, but this digital audiotape system is a bargain when it comes to price. *Aug 96, p. 143*

★★★★/7.0 **PDC 2400**, ProDirect, 612/941-1805, $800. 2.4GB drive is tops for speed, value, and design. *Jun 96, p. 153.* Editors' Choice for best 1.0GB to 2.5GB hard drive.

★★★/6.2 **PDI 1200**, ProDirect, 612/941-1805, $335. Average speed undermines 1.2GB drive's excellent design. *Jun 96, p. 153*

★★★/5.6 **Performa 5125CD**, Apple Computer, 408/996-1010, $2300. The all-in-one design is appealing, but the performance is just so-so. *Feb 96, p. 96*

★★★/5.1 **PocketHammer 2050**, FWB, 415/325-4392, $1479. Merely moderate performer, 2.1GB drive has hard-to-adjust settings. *Jun 96, p. 153*

★★★★/7.6 **PowerBook 500 PowerPC Upgrade**, Apple Computer, 408/996-1010, $769 with 8MB of RAM. Solid path to PowerPC for 500-series notebooks. *Aug 96, p. 54*

★★★/5.8 **PowerBook 5300**, Apple Computer, 408/

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Star Ratings

996-1010, $2300. A gray-scale screen and middling performance make this just an acceptable notebook. *Feb 96, p. 96*

★★★/5.9 **PowerBook 5300c,** Apple Computer, 408/996-1010, $4500. A great color screen and strong expandibility balance with so-so performance. *Feb 96, p. 58.* **Editors' Choice** for best portable Mac.

★★★/5.9 **PowerBook 5300cs,** Apple Computer, 408/996-1010, $3600. Good expansion, so-so speed, and a decent color screen make this fine for short-term use. *Feb 96, p. 96*

★★★/5.9 **PowerBook Duo 2300c,** Apple Computer, 408/996-1010, $3699 (8MB of RAM, 750MB hard drive); $4699 (20MB of RAM, 1.1GB hard drive, 14.4-Kbps fax modem). This new Duo packs a lot of power into a little package. *Apr 96, p. 58*

★★★/6.3 **PowerCenter 120,** Power Computing, 512/388-6886, $1995. The cheapest fast desktop Mac outdoes Apple's Power Mac 7500/120 in terms of price, and is near enough in speed. *Jul 96, p. 84*

★★★/5.9 **PowerCenter 120 Low Profile,** Power Computing, 512/388-6886, $1895. This system's low-profile case limits internal-drive expansion, and it doesn't really save space except maybe in a cubicle with low shelves, so go for the full-size PowerCenter desktops. *Jul 96, p. 84*

★★★★/7.1 **PowerCenter 132,** Power Computing, 512/388-6886, $2495. A little cheaper and a little slower than the PowerCenter 150; this is the desktop Mac to get if you want to shave some costs. *Jul 96, p. 84*

★★★★/7.3 **PowerCenter 150,** Power Computing, 512/388-6886, $2995. Until Apple puts more muscle in the Power Mac 7500, this is the best desktop choice—and it's not too expensive. *Jul 96, p. 84.* **Editors' Choice** for best business user's system.

★★/4.6 **Power Macintosh 7200/120,** Apple Computer, 408/996-1010, $2299. Apple should discontinue this line. It's not that cheap, and to upgrade it later to a 7600 will cost another $2000—way too much. *Jul 96, p. 84*

★★★/5.8 **Power Macintosh 7600/120,** Apple Computer, 408/996-1010, $2999. Apple's new flagship desktop Mac doesn't go far enough in performance. While the price hasn't changed, it's now outclassed by Power Computing's lineup. *Jul 96, p. 84*

★★★/5.8 **Power Macintosh 8500/132,** Apple Computer, 408/996-1010, $3899. For a moderate drop in performance, you can get a big price break on the 8500/120 versus the 8500/150, but it's still just for AV users. *Jul 96, p. 84*

★★★/6.0 **Power Macintosh 8500/150,** Apple Computer, 408/996-1010, $4699. AV professionals will continue to like the 8500, despite its hard-to-upgrade design and high price. *Jul 96, p. 84*

★★★/5.6 **Power Macintosh 9500/150,** Apple Computer, 408/996-1010, $4799. The real advantages of the pricey but fast 9500/150 are its six PCI slots. Otherwise, a PowerTower has better speed and a nicer price. *Jul 96, p. 84*

★★★/5.1 **PowerShop,** Adaptive Solutions, 503/690-1236, $2000 (estimated). This card is worth considering if its few accelerated tasks are among those you perform regularly. *Jun 96, p. 87*

★★★★/7.1 **PowerTower 166,** Power Computing, 512/388-6886, $3795. Comparable in performance to a Power Mac 8500/150, the PowerTower 166 is cheaper but lacks AV features. *Jul 96, p. 84*

★★★★/7.3 **PowerTower 180,** Power Computing, 512/388-6886, $4195. The top Mac performer, this tower also offers a good price and sufficient expansion for most people, but suffers from a hard-to-upgrade design. *Jul 96, p. 84.* **Editors' Choice** for best power user's system.

★★★★/8.1 **PR2-16828W,** ProMax Technology, 714/727-3977, $8890. PCI disk array has comparatively low price, can repartition with reconfiguring hardware. Has confusing installation guide for drives. *May 96, p. 57*

★★★/6.0 **Premier DLT,** MicroNet Technology, 714/453-6000, $7115. A top-performing DLT drive in all tests, but talk about sticker shock. *Aug 96, p. 143*

★★/4.2 **Psion Series 3a,** Psion, 508/371-0310, $595. PDA has good software features, but its awkward L-shape when open is unstable on uneven surfaces. *Jul 96, p. 102*

★★★/5.9 **Q1080,** APS Technologies, 816/483-1600, $350. 1.1GB drive is a slightly above–middle-of-the-road performer. *Jun 96, p. 153*

★★★★/7.0 **Quantum DLT 2000XT,** Quantum, 408/894-4000, $4200. One of the best performers with large folders in our tape-backup system roundup, it didn't do as well in our tests with large files. *Aug 96, p. 143*

★★★/5.1 **SCSI PowerPlug II,** Hot Wire Technology, 203/761-0651, $119.99. A fast way to swap SCSI devices. *Feb 96, p. 86*

★★★/6.5 **SledgeHammer 3500FMF PCI II,** FWB, 415/325-4392, $5129. Software easy to use, but cables sometimes difficult to attach in configuring this PCI disk array. *May 96, p. 57*

★★★/6.9 **SledgeHammer 7000FMF PCI II,** FWB, 415/325-4392, $9439. Fastest PCI disk array tested, but cables sometimes difficult to attach. *May 96, p. 57*

★★/4.5 **SSW-1800,** MicroNet Technology, 714/453-6100, $2185. 2.1GB drive is a slow performer all around. *Jun 96, p. 153*

★★/4.2 **SureStore Tape 6000e,** Hewlett-Packard, 970/669-8000, $1300. One of the more expensive DAT drives, with average performance results. *Aug 96, p. 143*

★★★/6.5 **Taurus AV4221,** Micropolis, 818/709-3300, $1270. Stunning design, solid performance, and a five-year warranty make this 2GB drive shine. *Jun 96, p. 153*

★★/4.8 **Zaurus ZR-5000,** Sharp, 201/529-8200, $499. PDA is easy to carry and offers decent graphics tools, but little supporting software, and no handwriting recognition is available. *Jul 96, p. 102*

VIDEO/DISPLAY

★★/4.2 **AlphaScan GLX,** Sampo Technology, 770/449-6220, $1495. Low price fails to outweigh poor image quality. *Feb 96, p. 165*

★★★★/7.8 **ATI Xclaim GA,** ATI Technologies, 905/882-2600, $449. Offers adequate video-display acceleration and superfast FreeHand previews at a low price. *Jun 96, p. 93*

★★/3.3 **Datashow AV 4500,** Sayett Technology, 716/624-1290, $4875. Panel has inscrutable menus; lackluster video performance. *May 96, p. 139*

★★★/6.9 **Diamond Javelin Video 3400XL,** Diamond Multimedia, 408/325-7000, $569. Offers decent video acceleration and enhanced QuickTime display, but shows its true colors as a Windows product: no control panel and a missing 832-by-624–pixel setting. *Jun 96, p. 93*

★★★/5.5 **Diamond Pro 21TX,** Mitsubishi Electronics America, 714/220-2500, $2199. Washed-out colors

hold back an otherwise strong contender. *Feb 96, p. 165*

★★★★/7.5 **Eris 1.0**, RSI Systems, 612/896-3020, $3995. Dedicated box is easy to install, but the system is expensive and you need to supply your own camera. *May 96, p. 82.* **Editors' Choice** for best-desktop videoconferencing system.

★★/4.4 **FlexScan F2 21**, Nanao, 310/325-5202, $2299. Blurry, dim image and too high a price. *Feb 96, p. 165*

★★★/6.8 **IMS TwinTurbo-128M**, Integrated Micro Solutions, 408/369-8282, $699. Slight screen-refresh artifacts and image shifts when changing bit depth detract from good video acceleration speeds. *Jun 96, p. 93*

★★★/6.8 **Kodak Digital Science DC50 Zoom Camera**, Eastman Kodak, 716/724-4000, $1000. Camera combines zoom and autofocus with good color and detail. *Jul 96, p. 57*

★★★★/7.1 **MagnaByte M3xv**, Telex, 612/884-4051, $3995. Easy to use, good image quality, mid-range price. *May 96, p. 139.* **Editors' Choice** for best LCD projection panels.

★★★/5.2 **MagniView 488B**, Dukane Audiovisual Products, 708/584-2300, $4995. Image quality is a notch below average in all categories. *May 96, p. 139*

★/2.8 **Matrox MGA Millennium**, Matrox, 514/969-6320, $649. Video-display acceleration is disabled when floating palettes overlap document windows—a major flaw. FreeHand preview performance isn't great, either. *Jun 96, p. 93*

★★★/6.8 **Meet-Me 1.0**, Sat Sagem, 408/446-8690, $2995. Good audio and video, but more expensive than the Apple system it's based on. *May 96, p. 82*

★★/4.8 **Multigraph 445X**, Nokia Display Products, 415/943-4071, $2775. Adequate image quality, but at too high a price. *Feb 96, p. 165*

★★★/6.2 **Multiple Scan 20 Display**, Apple Computer, 408/996-1010, $2149. Not as vibrant as it could be, but good value. *Feb 96, p. 165*

★★★/5.9 **MultiscanTC**, Sony, 408/432-0190, $3950. Special color-adjustment tools don't overcome mediocre performance. *Feb 96, p. 165*

★★★/6.8 **MultiSync M500**, NEC, 508/264-8000, $599. Multimedia monitor has a top-notch picture and decent sound. *Jul 96, p. 69*

★★★★/7.3 **MultiSync XE21**, NEC Technologies, 508/264-8000, $1899. Rich, bright images complemented by excellent controls. *Feb 96, p. 165*

★★★/5.8 **MultiView 21**, Radius, 408/541-5700, $2149. Seductively rich colors, but too soft a focus. *Feb 96, p. 165*

★★★★/8.3 **Number Nine Imagine 128**, Number Nine Visual Technology, 617/674-0809, $999. The fastest overall video acceleration of the PCI cards we reviewed, plus support for 1600-by-1200 resolution, at a relatively high cost. *Jun 96, p. 93*

★★★/5.0 **Ovation 810**, Proxima, 619/457-5500, $3295. A better value than Proxima's high-end Ovation 846C panel. *May 96, p. 139*

★★/4.7 **Ovation 846C**, Proxima, 619/457-5500, $5995. Design and features outshine image quality of this projection panel. *May 96, p. 139*

★★★/5.0 **PanaSync/Pro C2192P**, Panasonic Communications & Systems, 201/348-7000, $1999. Reasonable price fails to overcome weak image quality. *Feb 96, p. 165*

★★★/6.6 **Pivot 1700**, Portrait Display Labs, 510/227-2700, $1099. Good image quality but doesn't automatically switch views when rotated. *Mar 96, p. 70*

★★★/5.4 **Polaview 3000**, Polaroid Electronic Imaging Systems, 617/386-2000, $5295. Unremarkable overall image quality, but above-average video. *May 96, p. 139*

★★/3.5 **PowerView 950V**, In Focus Systems, 503/685-8888, $9499. Innovative concepts but substandard image quality; overpriced. *May 96, p. 139*

★★★★/8.6 **PressView 21 SR**, Radius, 408/541-6100, $3999. The best professional-quality display gets better. *Feb 96, p. 62*

★★/4.3 **ProColor 1701**, Boxlight, 360/779-7901, $6499. Panel has substandard image quality and hard-to-use controls. *May 96, p. 139*

★★★/5.0 **QuickDraw 3D Accelerator Card**, Apple Computer, 408/996-1010, $400. Supports texture maps but only minor speed gains with major 3-D applications. *Apr 96, p. 60*

★★★★/7.1 **QuickTime Conferencing Kit 1.0**, Apple Computer, 408/996-1010, $2000. Good value, straightforward LAN- and ISDN-capable software, but no digitizer included and ISDN setup is complex. *May 96, p. 82*

★★/3.5 **Radius Thunder 30/1600**, Radius, 408/541-6100, $1499. An incompatibility with FreeHand causes preview speeds to plummet, but otherwise this PCI video-display card offers solid performance and a nice control panel. *Jun 96, p. 93*

★★★★/7.2 **Rainbow 30/10**, Chisholm, 408/559-1111, $4995. Panel is carefully designed for ease of use; a good value. *May 96, p. 139.* **Editors' Choice** for best LCD projection panels.

★★★★/7.3 **RasterOps SuperScan Mc 21**, NSA/Hitachi, 617/461-8300, $2299. Top performance plus sensible, intuitive controls create a winning combination. *Feb 96, p. 165.* **Editors' Choice** for best two-page monitor.

★★★/6.5 **ShareVision Mac3000 1.0**, Creative Labs, 408/428-6600, $1149. Easy to install with good sound quality, but small maximum frame size and poor synchronization are problems. *May 96, p. 82*

★★/4.0 **Sharp QA-2500**, Sharp, 201/529-8731, $9995. Panel offers overly complex image controls; expensive. *May 96, p. 139*

★★★/5.5 **SmartView 3600**, In Focus Systems, 503/685-8888, $3799. A solid LCD performer and a good value. *May 96, p. 139*

★★/4.1 **SyncMaster 20GLs**, Samsung Electronics America, 201/691-6200, $1599. Glare-catching, image-distorting tube and weak controls. *Feb 96, p. 165*

★★★/5.8 **ViewSonic 21PS**, ViewSonic, 909/869-7976, $2095. Bright, vibrant, though not particularly sharp image. *Feb 96, p. 165*

★★★/5.3 **VisionMaster Pro 21**, Iiyama North America, 215/957-6543, $1995. Good image quality, but confusing controls. *Feb 96, p. 165*

★★★/5.9 **Vision Q3 LCD Panel**, Apollo Presentation Products, 516/467-8033, $6750. Top image quality but difficult to use. *May 96, p. 139*

★★★/5.2 **Visit Video 2.0 (2.1)**, Northern Telecom, 214/684-1000, $2999. Good call management and supplies all hardware, but lacks H.320 support and has small on-screen frame size. *May 96, p. 82*

★★★/5.0 **VR-1000 3-D Stereoscopic LCD Projection Panel**, VRex, 914/345-8877, $6995. The only choice for projecting 3-D images, though stereo 3-D images don't integrate well with standard PowerPoint or Persuasion slide shows. *May 96, p. 139*

★/1.9 **Yarc Screamer**, Yarc Systems, 805/499-9444, $995. Supports texture maps but slower than using no board in some instances; chokes on simple models. *Apr 96, p. 60*

★★★/5.6 **Z215**, nView, 804/873-1354, $5695. Good image quality, very sleek and compact. *May 96, p. 139* m

VIEWPOINT *continued from page 286*

is a possible DC power standard. An arbitrary one, to be sure, but perhaps we should probably just be grateful that it was designed by a car mechanic in an afternoon and not a computer-industry standards committee in a lifetime. Keep the voltage level, design a new, small plug, and you have a new standard.

The immediate advantage of adopting it would be that you would only need one DC power adapter! Think of that! Well, not exactly one—you might need a dozen of them, but they would all be exactly the same! Just get a box of 'em! They'll just be a commodity item like, um, well, I was going to say lightbulbs, but lightbulbs come in all sorts of different wattages and fittings. The great thing about having a DC power standard is that it would be much better than lightbulbs.

Apart from doing away with endless confusion and inconvenience, the arrival of a new standard would encourage all sorts of other new features to emerge. Power points in convenient places in cars. DC power points in homes and offices and, most important, DC power points in the armrests of airplane seats . . .

I have to own up and say that, much as I love my PowerBook, which now does about 97.8 percent of what I used to use the lumbering old desktop dinosaurs for, I've given up trying to use it on planes. Yes, yes, I know that there are all sorts of power-user strategies you can use to extend your battery life—dimming modes, RAM disks, processor resting, and so on—but the point is that I really can't be bothered. I'm perfectly capable of just reading the in-flight magazine if I want to be irritated. However, if there were a DC power supply in my armrest, I would actually be able to do some work, or at least fiddle with stuff. I know that the airline companies will probably say, "Yes, but if we do that, our aeroplanes will fall out of the sky," but they always say that. I know that sometimes their planes do fall out of the sky, but—and here's the point—not nearly as often as the airline companies say they will. I for one would be willing to risk it. In the great war against little dongly things, no sacrifice, I think, is too great. m

DOUGLAS ADAMS, author of the *Hitchhiker's Guide to the Galaxy* books and the Dirk Gently books, is Chief Fantasist of The Digital Village, a new London-based multiple media company.

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10	Anthro	—	800/325-3841
138,139	Apple Computer	—	—
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37	CE Software, Inc.	170	800/523-7638
159	Claris	—	—
161	Claris	—	—
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156	Luckman Interactive	65	800/711-2676
222,223	Mac Bargains	70	800/619-9091
234,235	Mac Zone	71	800/436-0606
240	MacAcademy	106	800/527-1914
230,231	MacConnection	145	800/800-3333
216,217	MacMall	131	800/222-2808
237	MacMarket	258	800/223-4622
99	Mactemps, Inc.	60	800/MACTEMPS
226,227	MacWarehouse	150	800/255-6227
176,177	Macworld Club	—	—
35	Mag Innovision	25	800/827-3998
218	MegaHaus	245	800/786-1184
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20	MetaTools, Inc.	4	800/472-9025
193	MicroMat	77	800/829-6227
IFC	Microsoft Corporation	—	800/531-6748
158	Microspot US, Inc	3	800/622-7568
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130,131	NEC Technologies	19	800/NEC-INFO
IBC	NEC Technologies	16	800/NEC-INFO
38,39	NEC Technologies	19	800/NEC-INFO
164	Netcom On-Line	54	800 NETCOM1
61	NewSoft	27	800/670-7364
180	Nikon	7	—
63	Now Software	56	800/237-2078
191	Drange Micro	33	714/779-2772
69	Polaroid	295	800/816-2611
2,3	Power Computing Corporation	161	800/410-7693
6,7	Power Computing Corporation	151	800/410-7693
211	ProDirect	135	800/524-9952
32	Qualcomm	—	800/2-eduora
14	Reply Corporation	—	800/801-6898
196	Seybold Expos	—	—
202	Seybold San Francisco	—	800/488-2883
73	SoftArc, Inc.	—	—
78	Softquad	28	800/387-2777
102,103	Sony Electronics	—	—
45	Specular International	41	800/433-7732
162	SPSS INC.	85	800/457-8287
49	Stalker Software	14	—
36	STF Technologies	80	800/880-7622
197	Symantec Corporation - Norton Utilities	—	800/695-0679
199	Symantec Corporation - Suitcase	—	800/695-0679
163	Syncronys Soft Corporation	55	888/777-5600
236	Texas Instruments	266	800/527-3500
96	Trinity Works	118	800/278-4944
15	Umax Computer	200	800/859-2728
147	ViewSonic	59	800/888-8583
21	Viking Components	233	800/338-2361
13	Visioneer	18	800/787-7007
195	VST Power Systems	73	508/287-4600
77	Xante Corporation	112	800/926-8839
87	Xaos Tools	15	800/BUY-XAOS
137	Xeikon	10	—
150	Xerox Corporation	115	800/248-6550
118,119	Xerox Corporation	100	800/248-6550

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Page No.	Advertiser	Reader Srvc. No.
SOFTWARE		
BUSINESS		
160	Inspiration Software	—
90	Intuit - QuickBooks	—
193	Intuit-QuickBooks	—
195	Intuit-QuickBooks	—
8	Kaetron Software	67
IFC	Microsoft Corporation	—
78	Softquad	28
36	STF Technologies	80
CAD/CAM		
101	Ashlar Incorporated	40
89	Engineered Software	12
26	Graphsoft	46
CD ROM		
153	Corel Corporation	78
285	Educorp	157
COMMUNICATION		
161	Claris	—
159	Claris	—
241	Dataviz	79
32	Qualcomm	—
73	SoftArc, Inc.	—
49	Stalker Software	14
36	STF Technologies	80
DATA MANAGEMENT		
184	ESRI	160
DIGITIZERS/SCANNERS		
88	Agfa	158
EDUCATIONAL		
187	Adam Software Inc.	37
ENTERTAINMENT		
153	Corel Corporation	78
FONTS		
12	Alsoft	140
GRAPHICS/DTP		
79	Adobe	251
83	Adobe	251
81	Adobe	251
51	Adobe - Photoshop	253
170	Adobe - Illustrator	252
12	Alsoft	140
22	Deneba Software	57
23	Deneba Software	—
129	Equilibrium	6
28	Image Club	50
8	Kaetron Software	67
9	MetaTools, Inc.	5
20	MetaTools, Inc.	4
158	Microspot US, Inc	3
45	Specular International	41
87	Xaos Tools	15
MISCELLANEOUS		
160	Inspiration Software	—
49	Stalker Software	14
150	Xerox Corporation	115
MULTIMEDIA		
129	Equilibrium	6
NETWORKING		
37	CE Software, Inc.	170
91	GDT Softworks	32
73	SoftArc, Inc.	—
OCR		
11	Caere Corporation	69
61	NewSoft	27
ONLINE		
82	EarthLink Network	8
156	Luckman Interactive	65
32	Qualcomm	—
PERSONAL		
90	Intuit - QuickBooks	—
195	Intuit-QuickBooks	—
SCIENTIFIC		
187	Adam Software Inc.	37
STATISTICAL		
162	SPSS INC.	85
UTILITIES		
85	Aladdin Systems Inco	21
84	Casady & Greene	58
92	Connectix - Speed Doubler	193
52	Dantz Development	26
93	GDT Softworks	42
117	Insignia Solutions	68
193	MicroMat	77
63	Now Software	56
163	Syncronys Soft Corporation	55
HARDWARE		
BOARDS		
80	Adaptec	—
167	ATI Technologies Inc	257
191	Orange Micro	33
14	Reply Corporation	—
CD ROM		
285	Educorp	157
IBC	NEC Technologies	19
COMPUTER SYSTEMS		
212	Big Mac Computers	101
228,229	CRA Systems Inc.	20
210	DigiCore	269
238,239	Express Direct	81
2,3	Power Computing Corporation	151
6,7	Power Computing Corporation	161
15	Umax Computer	200
DIGITIZERS/SCANNERS		
24,25	Epson America	—
29	Microtek Lab, inc.	105
180	Nikon	7
DISPLAY		
228,229	CRA Systems Inc.	20
95	Hitachi NSA	74
35	Mag Innovision	25
74	Mitsubishi Electronics America	261
IBC	NEC Technologies	16
130,131	NEC Technologies	19
69	Polaroid	295
147	ViewSonic	59
EXPANSIONS/UPGRADES		
284	L.A.Trade	—
96	Trinity Works	118
21	Viking Components	233
HARD DISKS/STORAGE		
224,225	Alliance Peripheral Systems	62
232,233	ClubMac	96
30,31	Iomega	76
95	Kingston Technology	201
218	MegaHaus	245
211	ProDirect	135
21	Viking Components	233
INPUT DEVICES		
154,155	Apple Computer	29
BC	Kensington Microware Ltd.	1
97	Logitech Incorporate	—
13	Visioneer	18
MICRO PROCESSOR		
2,3	Power Computing Corporation	151
6,7	Power Computing Corporation	161
96	Trinity Works	118
MISCELLANEOUS		
148,149	American Power Conversion	72
14	Big Island	24
137	Xeikon	10
MODEMS		
71	Global Village	—
MULTIMEDIA		
102,103	Sony Electronics	—
POWERBOOK		
195	VST Power Systems	73
PRINTERS		
24,25	Epson America	—
236	Texas Instruments	266
77	Xante Corporation	112
SECURITY		
148,149	American Power Conversion	72
VIDEO		
94	Connectix - QuickCAM	191
SERVICES		
ON LINE		
82	EarthLink Network	8
156	Luckman Interactive	65
164	Netcom On-Line	54
TRADESHOWS/CONFERENCES		
196	Seybold Expos	—
202	Seybold San Francisco	—
TRAINING		
240	MacAcademy	106
99	Mactemps, Inc.	60
ACCESSORIES		
FURNITURE		
10	Anthro	—
MISCELLANEOUS		
86	Avery International	17
MAIL ORDER		
224,225	Alliance Peripheral Systems	62
212	Big Mac Computers	101
232,233	ClubMac	96
213,215	Computer Discount Warehouse	2
52	DC Pro	53
210	DigiCore	269
238,239	Express Direct	81
207-209	J&R Computerworld	282
284	L.A.Trade	—
219-221	LaCie	52
222,223	Mac Bargains	70
234,235	Mac Zone	71
230,231	MacConnection	145
216,217	MacMall	131
237	MacMarket	258
226,227	MacWarehouse	150
218	MegaHaus	245
211	ProDirect	135
Web Watch		
168	Agfa	
168	Box Top Software	
168	MacSourcery	
168	Image Club Graphics	
168	Impossible Software	
168	Max Computers	
168	NetJet	
168	The Software Source	
169	AutoGraphix & Phaedrus	
169	Interactive Creations	
169	DeskTop Laster & Ink Jet	
169	Pritner Labels	
169	OnBase Technologgy	
DIRECTORY		282-283

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6	7	8	9	10	161	162	163	164	165	276	277	278	279	280	491	492	493	494	495
11	12	13	14	15	166	167	168	169	170	281	282	283	284	285	496	497	498	499	500
16	17	18	19	20	171	172	173	174	175	286	287	288	289	290	501	502	503	504	505
21	22	23	24	25	176	177	178	179	180	291	292	293	294	295	506	507	508	509	510
26	27	28	29	30	181	182	183	184	185	296	297	298	299	300	511	512	513	514	515
31	32	33	34	35	186	187	188	189	190	401	402	403	404	405	516	517	518	519	520
36	37	38	39	40	191	192	193	194	195	406	407	408	409	410	521	522	523	524	525
41	42	43	44	45	196	197	198	199	200	411	412	413	414	415	526	527	528	529	530
46	47	48	49	50	201	202	203	204	205	416	417	418	419	420	531	532	533	534	535
51	52	53	54	55	206	207	208	209	210	421	422	423	424	425	536	537	538	539	540
56	57	58	59	60	211	212	213	214	215	426	427	428	429	430	541	542	543	544	545
61	62	63	64	65	216	217	218	219	220	431	432	433	434	435	546	547	548	549	550
66	67	68	69	70	221	222	223	224	225	436	437	438	439	440	551	552	553	554	555
71	72	73	74	75	226	227	228	229	230	441	442	443	444	445	556	557	558	559	560
76	77	78	79	80	231	232	233	234	235	446	447	448	449	450	561	562	563	564	565
81	82	83	84	85	236	237	238	239	240	451	452	453	454	455	566	567	568	569	570
86	87	88	89	90	241	242	243	244	245	456	457	458	459	460	571	572	573	574	575
91	92	93	94	95	246	247	248	249	250	461	462	463	464	465	576	577	578	579	580
96	97	98	99	100	251	252	253	254	255	466	467	468	469	470	581	582	583	584	585
101	102	103	104	105	256	257	258	259	260	471	472	473	474	475	586	587	588	589	590
106	107	108	109	110	261	262	263	264	265	476	477	478	479	480	591	592	593	594	595
111	112	113	114	115	266	267	268	269	270	481	482	483	484	485	596	597	598	599	600
116	117	118	119	120															
121	122	123	124	125															
126	127	128	129	130															
131	132	133	134	135															
136	137	138	139	140															
141	142	143	144	145															
146	147	148	149	150															
151	152	153	154	155															

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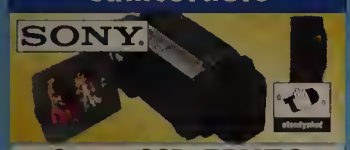

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$1299.95 (SON CCDTRV70)

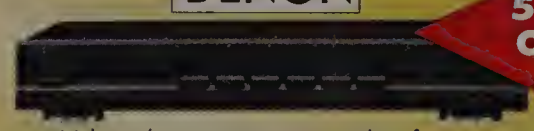
Panasonic PV-D406
•VHS-C, 16x optical/22x dig. zoom $729.95

Sony CCD-TR94
•8mm, 12x optical/24x dig. zoom . . CALL

JVC GRD-V1
•Digital Camcorder, 100x dig zoom . . CALL

SPECIAL PURCHASE

Denon DA-500
D/A Converter
•If you own a good CD player already (and it has either coaxial or optical outputs) and you want to upgrade to state-of-the-art sound, this is the most affordable way to do it •The ALPHA processing delivers ultra-smooth & detailed sound without any harshness •20-bit D/A converter •3-sampling frequencies for any type of digital input source
Mfr. Sug. Retail $500.00



50% Off Mfr. Sug. Retail
$249.95 (DNN DAS00)

Mini Audio Systems

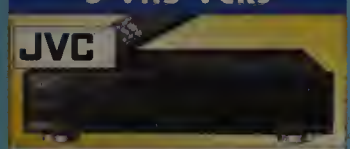
JVC MXC770
Compact Component System
•2-chassis design •4 built-in amplifiers •50 watts x 2 channels (main: 18 watts x 2, subwoofer: 32 watts x 2) •Remote with jog/shuttle dial •7-disc CD changer •2-way 3-speaker labyrinth port subwoofer system
$499.95 (JVC MXC770)

JVC MXC550
•6-CD, dual auto-rev. cassette . $399.95

Aiwa NSX-V150M
•50+1 CD, auto-rev dual cassette $469.95

Yamaha CC-75
•3-disc CD, auto-rev. cassette . . $599.95

S-VHS VCRs



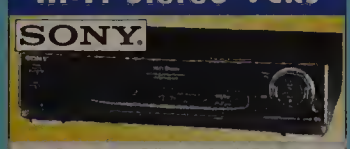
JVC HR-S7100
S-VHS Hi-Fi Stereo Recorder
•VCR Plus+ with multi-system cable box controller •Jog/shuttle remote control with illuminated buttons •Random assemble & insert editing •1-year/8-event programming
$499.95 (JVC HRS7100)

Panasonic PVS-4670
•Hi-Fi Stereo, VCR Plus + ... $399.95

Panasonic AG-1980
•Hi-Fi Stereo, assemble-editing . $1269.95

Sony SLV-R1000
•Hi-Fi Stereo, VCR Plus + ... CALL

Hi-Fi Stereo VCRs



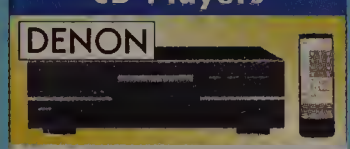
Sony SLV-940HF
Hi-Fi Stereo VHS Recorder
•4-heads •VCR Plus+ programming •Sony Shuttle control •Audio/Video insert edit •Flying Erase™ Head •8-event/1-month timer •Unified remote controlty
$399.95 (SON SLV940HF)

Panasonic PV-4564
•4-heads, VCR Plus + ... $299.95

JVC HR-J630
•4-heads, Hi-Fi Stereo . . . . . CALL

Toshiba M-781
•6-heads, Hi-Fi Stereo VCR Plus + $449.95

CD Players



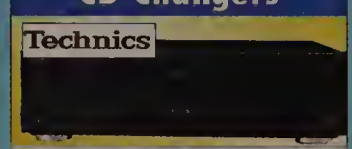
Denon DCD-3000
Compact Disc Player
•ALPHA processor for outstanding detail •Real 20-bit super linear converter •8x oversampling •Optical & coaxial output •20-track programming •Remote control
$699.95 (DNN DCD3000)

Luxman D-322
•Heavy-duty suspension, remote $299.95

Dynaco CDV-1
•Tube output section, remote . . $559.95

Recordable Audio CD Player
•It's here, for information . . . . . CALL

CD Changers



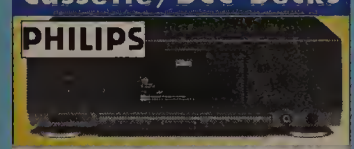
Technics SL-PD787
5-Disc CD Changer
•Change any 4 discs while a 5th plays •Full random play •32-track programming •Repeat capable for single track or whole disc •MASH 1-bit D/A converter
$149.95 (TEC SLPD787)

Magnavox CDC-74517
•5-disc, Bitstream, remote . . . $149.95

Technics SL-MC400
•110 + 1 disc, remote $269.95

Aiwa DX-C100M
•100-disc, remote $249.95

Cassette/DCC Decks



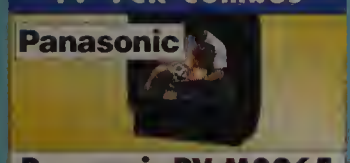
Philips DCC900
Digital Compact Cassette Recorder
•Records & plays DCC tapes •Plays back analog cassettes using Dolby B & C •Auto-reverse •Headphone jack •Remote control
$199.95 (PHI DCC900)

JVC TDW-709 Cassette deck
•Dual auto-rev. record/play . . $199.95

Aiwa AD-S950 Cassette deck
•3-hd. Dolby S/B/C/HX-Pro . . $279.95

Teac V-8030S Cassette deck
•3-heads, Dolby S/B/C/HX-Pro $699.95

TV VCR Combos



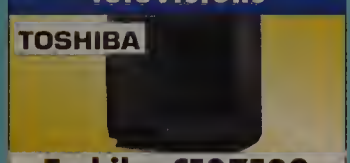
Panasonic PV-M2065
20" Stereo TV/VCR Combo
•4-head VHS Hi-Fi stereo VCR •Front A/V input •Program Director™ •Universal remote •On-screen display •Real time counter •Digital auto tracking
$499.95 (PAN PVM2065)

Samsung CXD1342
•13" Color TV/VHS recorder . . $299.95

JVC TVC2026
•20" Color TV/VHS VCR, VCR Plus $449.95

Toshiba CV-27D48
•27" Color TV/Hi-Fi stereo VHS VCR $699.95

Televisions



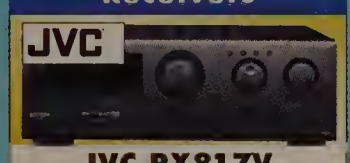
Toshiba CF27E30
27" Stereo Color TV
•BLACKSTRIPE® II picture tube •Dark-tint screen •Extended Data Service •1 A/V input •MTS with dbx®/SAP •181-channel tuning •10 watts audio output •Remote
$399.95 (TOS CF27E30)

Sony KV-13TR28
•13" Color stereo monitor . . . . . CALL

Panasonic CT-20G11
•20" Color stereo television . . $249.95

JVC AV-35BP6
•35" color stereo TV/monitor $1099.95

Receivers



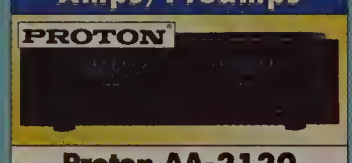
JVC RX817V
Audio/Video Receiver
•Stereo: 105 watts per channel •Surround: (front) 3 x 105 watts, (rear) 2 x 25 watts •Digital Acoustics Processor •Spectrum peak indicator •Front A/V input
$349.95 (JVC RX817V)

Technics SA-EX100
•100 watts/channel, remote . . $179.95

Technics SA-GX490
•Home Theater, 100 watts/ch . $249.95

Technics SA-TX50
•THX A/V, 125 watts/channel . . . . CALL

Amps/Preamps



Proton AA-2120
Power Amplifier
•120-watts per channel power amp •Dual mono configuration •High current •Stable to 2 ohms •Large VU meters
$299.95 (PRT AA2120)

AudioSource AMP One
•Power Amp, 80 watts/channel . $269.95

Luxman M-375
•Power Amp, 150 watts/channel $799.95

Luxman C-383
•Preamplifier, MM/MC, remote $799.95

Subwoofers

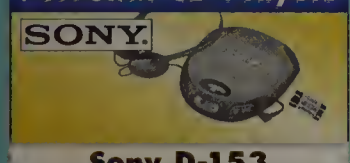
JBL PS120
Powered Subwoofer
•Built-in100 watt amp •12" woofer •Variable crossover and input gain •Magnetically shielded •23-250Hz frequency response •Auto shut-off •Black finish
$299.95 EA (JBL PS120)

JBL PS60
•50 watts, 6.5" woofer . $199.95 ea

JBL PS100
•50 watts, 12" woofer . . $249.95 ea

Cerwin-Vega HT-12PWR
•150 watts, 12" woofer . . $399.95 ea

Personal CD Players



Sony D-153
Rechargeable Discman®
•10-playback modes •22-track RMS programming •Digital Mega Bass® sound •LCD screen •Includes rechargeable battery, AC adaptor and headphones
$89.95 (SON D153)

Panasonic SL-S240
•3-second anti-shock memory . . . $119.95

Sony D-242CK
•Car Discman with 3-second ESP . $149.95

Aiwa XP-R800
•3-second ESP and AM/FM tuner . $179.95

Boom Boxes

Sony CFD-121
CD/Radio/Cassette Portable Stereo
•AM/FM tuner •Top-loading CD player (8x oversampling) with 20-track random programming •Mega Bass enhancement •LCD display
$99.95 (SON CFD121)

Panasonic RX-DS520
•CD/cassette/AM/FM recorder . . $129.95

Aiwa CSD-ES70
•CD/cassette/AM/FM recorder . $149.95

Sony CFD-626
•6-CD/cassette/radio recorder . $229.95

Nikon Cameras

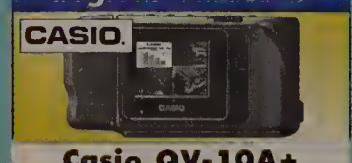
Nikon FM2N-T
Limited Edition Manual SLR Camera with Titanium Body
•60/40 center-weighted metering •Manual focus & manual exposure •3-point LE exposure display in viewfinder •Body only
$599.95 (NKN FM2N-T)

Nikon N50 Kit
•Body, lens, battery, film, strap $499.95

Nikon N6006 Outfit
•Body, lens, battery, film, strap $529.95

Nikon N70
•Autofocus SLR body $549.95

Digital Cameras



Casio QV-10A+
Liquid Crystal Digital Camera
•Built-in 1.8" TFT color screen •96 images can be saved in memory •480 x 240 dpi •Includes software for Windows and Macintosh
$449.95 (CAS QV10A+)

Kodak DC-20
•For PC or Macintosh $299.95

Casio QV-30
•2.5" screen, Mac or PC $649.95

Kodak DC-40
•756 x 504 pixels, Mac or PC . . $649.95

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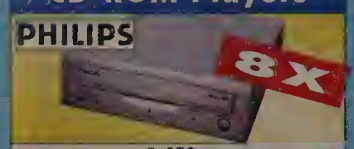
CD-ROM Players

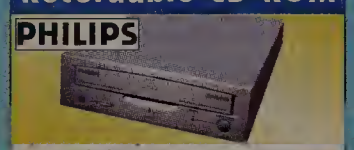


Philips 8X CD-ROM Player
•1.2MB per second transfer rate •195ms average access rate •256K data buffer •Power save after 5 min. •Caddyless, motorized disc loading tray •2 year warranty

$299.95 (PHI PCA80SC40)

Sony External 4X CD-ROM (SON CSD7611M) $289.95
Micronet External 4X CD-ROM Kit (MNT ADVMM4X) $389.95
Panasonic Portable 4X CD-ROM (PAN KXLD742) $399.95

Recordable CD-ROM



Philips CDD2000
2X Write/4X Read CD-ROM
•External read/write CD-ROM player •Up to 780MB capacity •706KB/sec. read •353KB/sec. read/write •Corel CD Creator, cable, and two (2) blank CD-R discs

$849.95 (PHI CDD2010/40)

Turtle Beach Internal 2Xwrite 4Xread (TBS 2040R) $849.95
Sony 4X read/2X write CD-ROM (SON CSP94115) $849.95
Micronet 2X Recordable CD-ROM (MNT MCDPLUS) $1099.95

UMAX®
Computer Corporation

UMAX S900D
SUPERMac **150MHz Mac OS-Compatible MiniTower Computer**
•150MHz 604 Power PC™ Processor •16MB RAM •8x CD-ROM •6 PCI Slots •3 Expansion Drive Bays •Built-in SCSI-2 and 10Base-T •2 Serial and 2 ADB Ports •Includes Extended Keyboard and Mouse •*Monitor, hard drive & video card not included*

$3095.95 (UMX S900D)

UMAX S900L
150MHz Mac OS-Compatible MiniTower Computer
•150MHz 604 Power PC™ Processor •2 GIG Hard Drive •16MB RAM exp. to 1 GIG •8x CD-ROM Dive •IMS Twin Torbo 128M Graphics Card with 4MB VRAM •2 Internal Expansion Drive Bays •6 PCI Slots •Built-in SCSI-2 and 10Base-T •2 Serial and 2 ADB Ports •Includes Extended Keyboard and Mouse •*Monitor not Included*

$3999.95 (UMX S900L)

Scanners Available from UMAX

Vista-S6E •Up to 4800 dpi •1 Pass ..... $399.95 (UMX VISTAS6EMAC)
Vista-S12 •Up to 9600 dpi •1 Pass ..... $799.95 (UMX VS12MACLE2)
Vista-S12 PRO2 •Up to 9600 dpi •1 Pass ..... $899.95 (UMX VS12MACPRO2)

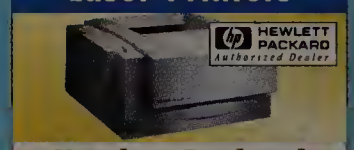
Inkjet Printers

Hewlett-Packard DeskWriter 660 Printer
•600 dpi resolution •Resolution Enhancement Technology •Prints on 4 x 6" up to 8.5 x 14" paper •Color printing with optional color kit •Up to 4-ppm in black, 1-ppm in color

$199.95 (HP C2185A)

Hewlett-Packard 660C (HP C2165A) $259.95
Hewlett-Packard 680C (HP C4550A) $309.95
Hewlett-Packard 855Cse (HP C4575A) $499.95

Laser Printers



Hewlett-Packard LaserJet 5MP
•600 x 600 dpi laser printing •Dual paper trays •Straight-through paper path •6-ppm •120 levels of gray •3MB RAM •Adobe™ PostScript™ Level-2 •Includes AppleTalk®

$999.95 (HP C3155A)

Hewlett-Packard LaserJet 5N (HP C3952A) $1549.95
Hewlett-Packard LaserJet 4M Plus (HP C2039A) $1599.95
Hewlett-Packard LaserJet 5M (HP C3917A) $1999.95

PNY MEMORY

for PowerBook 5300
4MB (PNY MM3750LLA4) . $99.95
8MB (PNY MM3750LLA8) $249.95
16MB (PNY MM3750LLA16) $349.95

for most Performa, LC, Centris & Quadra Series
4MB (PNY 4MEG-05) $59.95
8MB (PNY 8MEG-02) $99.95
16MB (PNY 16MEG-01) .. $199.95
32MB (PNY 32MEG-01) .. $349.95

for most Power Macs
8MB (PNY 8MEG-05) $99.95
16MB (PNY 16MEG-05) .. $199.95
32MB (PNY 32MEG-05) .. $349.95

Video Cards

Miro MiroMotion DC20
•Full-screen and full-motion digital video editing system •Studio quality digitization •Compatible with all video standards •Full S-video with PCI technology •JPEG compression

$799.95 (MRO MOTIONDC20)

ATI Xclaim GA 4MB True Color Board (ATI 4M8XCLAIM) $449.95
Matrox 4MB MGA Millennium (MOX 4MBPOWERMIL) $399.95
Matrox 8MB MGA Millennium (MOX 8MBPOWERMIL) $659.95

Radius Video Cards

Radius PrecisionColor 8/1600
•Fast, super resolution graphics card gives you productivity gains with business applications at a cost-effective price •1600 x1200 @ 8-bits, 832 x 624 @ 24-bits

$549.95 (RAD PRECLR81600)

Radius Thunder 30/1152 (RAD THUND301152) $899.95
Radius Thunder 30/1600 (RAD THUND301600) $1299.95
Radius Thunder 30/1152 w/Color Eng (RAD COLOR301152) $1799.95

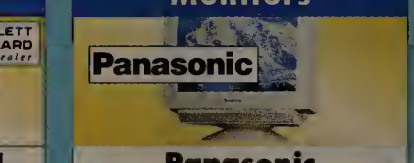
Scanners

Hewlett-Packard ScanJet 4P Color Scanner
•24-bit one pass design •300 dpi optical and 1200 dpi enhanced resolution •7.5-second B&W and 15-second color scanning •Includes HP Picturescan & ScanJet copy utility

$499.95 (HP C1139A)

Visioneer PaperPort VX (VIR PAPERVXMAC) $299.95
Microtek E3 Color Scanner (MTK SCANE3) $399.95
Hewlett-Packard ScanJet 3C (HP C2529A) $899.95

Monitors

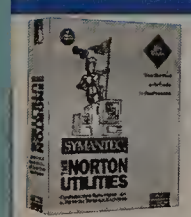


Panasonic PanaSync™ S17
17" Digital Color CRT Display
•0.27mm dot pitch •1,280 x 1,024 maximum resolution NI •MPR-II certified •DQ-QAF electron gun •Power-saving •3-year parts/labor

$699.95 (PAN S17)

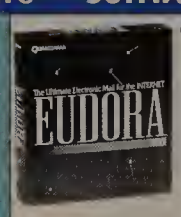
Portrait Pivot 1700 17" Monitor (PDL M1716-02) $999.95
Sony GDM-17se-IIT 17" Monitor (SON GDM17SE-IIT) $969.95
Sony CPD-20sf-II 20" Monitor (SON CPD20SF-II) $1649.95

Software • Software • Software • Software • Software • Software • Software



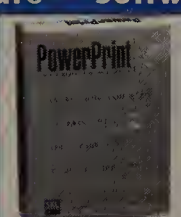
Symantec *The Norton Utilities (3.2)*
$89.95

Type Manager (3.9) .. $39.95
Quicken (6.0) $44.95
RAM Doubler $54.95
Quicken (6.0) Deluxe . $59.95
Gallery Effects (1.5.2) $69.95
C++ (7.0) $79.95
Final Draft (4.0) $239.95
Pointer (4.0) $339.95
SoftWindows 95 (3.0) $339.95



Qualcomm Software *Eudora Pro*
$49.95

Quicken Family Lawyer $24.95
Art Explosion 40,000 Images $44.95
Claris Organizer (1.0.3) $49.95
Hard Disk Toolkit (1.7) Personal Edition $49.95
Collaborator (2.0) $59.95
Virex (5.6) $69.95
Now Utilities (6.0) $79.95
FileMaker Pro (3.0) . $189.95



GDT Mac *PowerPrint (3.0)*
$89.95

Conflict Catcher (3.1) ... $64.95
Gallery 2 ..... $69.95
Suitcase (3.0) $69.95
RAM & Speed Doubler $79.95
PageMill $99.95
Japanese Language Kit (1.2) (APP M1648Z/C) $149.95
Act (2.5) $159.95
QuickBooks Pro (4.0) $189.95

Apple *Internet Connection Kit (1.1)*
$39.95

At Ease (APP M1859Z/D) $29.95
Inside the SAT & the PSAT $29.95
Typing Tutor (7.0) ... $29.95
E-Mailer (1.1) $39.95
Speed Doubler (1.1) . $54.95
FoxPro (2.6) $89.95
Kai's Power Tools (3.0) $124.95
MYOB Accounting (6.0) with Payroll $129.95

Now *Up•To•Date & Contact (3.6)*
$69.95

A Stroll in 20th Century Art $14.95
Quick Reference Atlas $19.95
3000 Image Fonts .. $19.95
Photoshop 3 Companion $34.95
ClickArt Handwritten Fonts $34.95
Berlitz Live Japanese $39.95
Dobbler (2.0) $44.95

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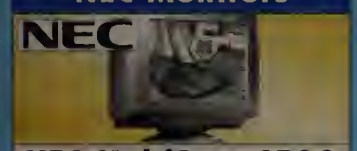
NEC Monitors



NEC MultiSync C500
15" Color Monitor
•Flat square screen •13.8 viewable image size •0.28mm dot pitch •Anti-static coating •1280 x 1024 non-interlaced PC resolution @ 60 to 76Hz, 1024 x 758 Mac res @ 75Hz

$369.95 (NEC CS00)

NEC MultiSync C400 14" Monitor (NEC C400) $284.95
NEC XV15+ 15" Digital Monitor (NEC XV15+) $469.95
NEC M500 Multimedia Monitor (NEC M500) $499.95

SyQuest® EZ135

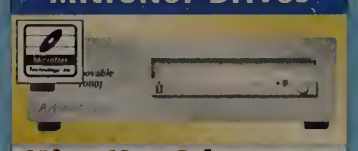
135MB External SCSI Drive

•The speed and the reliability of a hard drive •Each 135MB cartridge holds as much data as 100 floppy disks •SCSI interface •3.5" cartridge •13.5ms access time •Fast back-up and retrieval •Includes cartridge, SCSI cable, and software

$119.95 (SYQ EZ135EXT)

Spare 135MB cartridge...**$19.95**/ea (SYQ 135MB)

MicroNet Drives



MicroNet Advantage
External 1-Gig Jaz Drive
•File size will no longer limit you with the combination of Jaz drive and disks •Faster than most hard drives •1-GIG of disk space on each cartridge •Includes one cartridge

$549.95 (MNT AOV1000JAZE)

Micronet 200MB SyQuest Drive (MNT ADV-SYQ200E) $499.95
Micronet Internal Jaz 1-GIG Drive (MNT AV1000JAZI4) $579.95
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28.8Kbps Data/Fax Modem
•S&R data up to 28,800 bps •V.34 •GlobalFax™, GlobalFax™ OCR & Data communications software •For Macintosh desktops

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-30.00 mail-in rebate
$169.95 final price
(GLV TELEPRTPLTN) *Offer Ends 8/31/96*

TelePort Platinum / Internet (GLV TELINTERNET)... $199.95, minus $30 mail-in rebate = $169.95

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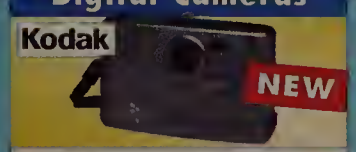
PCMCIA PowerPort Platinum Pro (GLV POWERPLTPRO). $499.95, minus $50 mail-in rebate = $449.95

Digital Cameras



Kodak DC20
Digital Science™ Camera
•Shirt-pocket size •24-bit color •1MB storage •Focus-free lens with automatic exposure •20-inch to infinity focus distance •Includes software for Mac & PC

$329.95 (KOD DC20)

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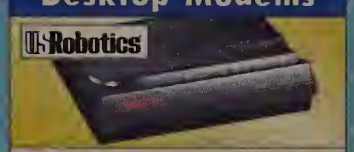
Kodak Digital Camera 40 (KOD DC40) $649.95
Kodak Digital Camera 50 (KOD DC50) $949.95

Desktop Modems



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Sportster® 28.8K bps Fax/Modem
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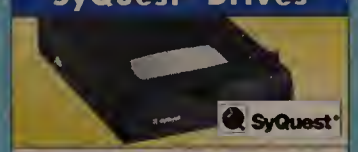
Supra Express v.34 Fax/Modem (SRA S0-2BXP-MC) $159.95
U.S.Robotics Sportster® /Speakerphone (USR EX288MACVC) $199.95

SyQuest Drives



SyQuest EZ230
230MB External SCSI Drive
•230MB formatted •13.5msec average access time •Reads 135 cartridges •Includes 1 235 cartridge

$299.95 (SYQ EZ230EXT)

SyQuest® EZ135 Drive (SYQ EZ135EXT) $119.95
SyQuest® 200MB Cartridge Drive (SYQ S914126) $399.95
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Micronet 200MB SyQuest® Drive (MNT ADV-SYQ200E) $499.95

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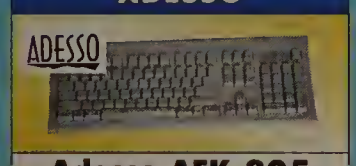
LapisColor MV16, 16-bit video card for S300 only (FOC LCMV16) .$159.95
LapisColor MV16-EN, video/ethernet (FOC LCMV16-EN) $179.95

ADESSO



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Soft Touch Plus Extended Keyboard
•105 silent, high quality, full stroke mechanical keyswitches •2 extra ADB parts •Keyboard-length wrist pad •One-year warranty

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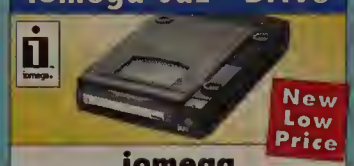
(BER ZIP100SCSI) *Offer Ends 9/30/96*

iomega Jaz™ Drive



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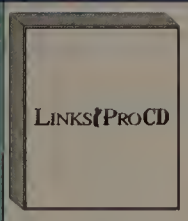

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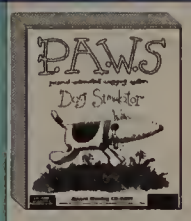

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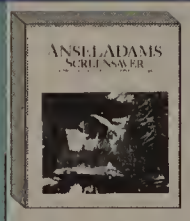

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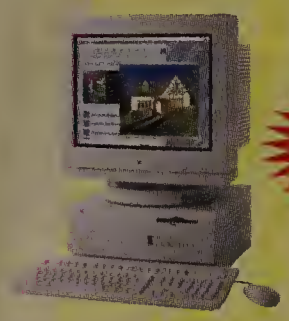

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8500/120, 16-2GB CD	3075	107
8500/120, 80-4.3GB CD	3895	135
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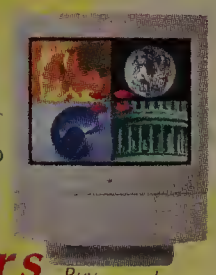

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Magnavox 17" MultiScan	625	21
Apple MultiScan 17" 1705	689	23
ViewSonic 17GS	675	23
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AppleVision 1710	869	29
Portrait Pivot 17"	925	31
AppleVision 1710AV	989	33
NEC XV 17+ Monitor	789	26
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	Buy	Lease
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StyleWriter 1500	265	9
Portable Color SW 2200	385	13
Color StyleWriter 2500	375	13
Epson Color Stylus Pro	585	20
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LaserWriter Select 360	1185	40
LaserWriter 12/640	1499	51
GCC Elite 600 ET Lite	1185	40
LaserWriter 16/600	2095	71
LaserWriter 12/600 w/Kit	5950	199
HP 560c	239	8
HP 855c	515	17
HP 5MP	995	34
HP 4MV	2699	91

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	Buy	Lease
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Microtek E3	369	12
Microtek E6	525	18
UMAX Vista S6	529	18
UMAX Vista S12 Pro	875	30
HP ScanJet 4C	899	30
Epson ES 1200C	998	33
Agfa Arcus II w/transp.	1825	62
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ThunderColor 30/1152	1475	50
EasyColor 24/1600	1699	56
Thunder Color 30/1600	1899	64
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	Buy	Lease
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SyQuest EZ135	199	7
Iomega JAZZ Drive	535	18
SyQuest 200	399	13
Apple 500 Meg 3.5"	99	3
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200 MB	66
270 MB	54
135 MB	17
230 MB	28

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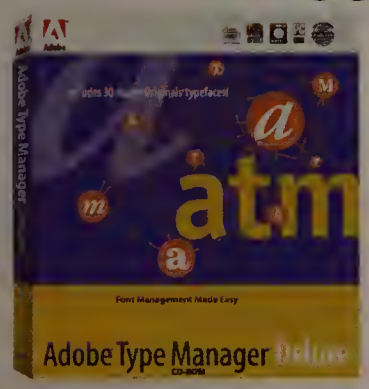

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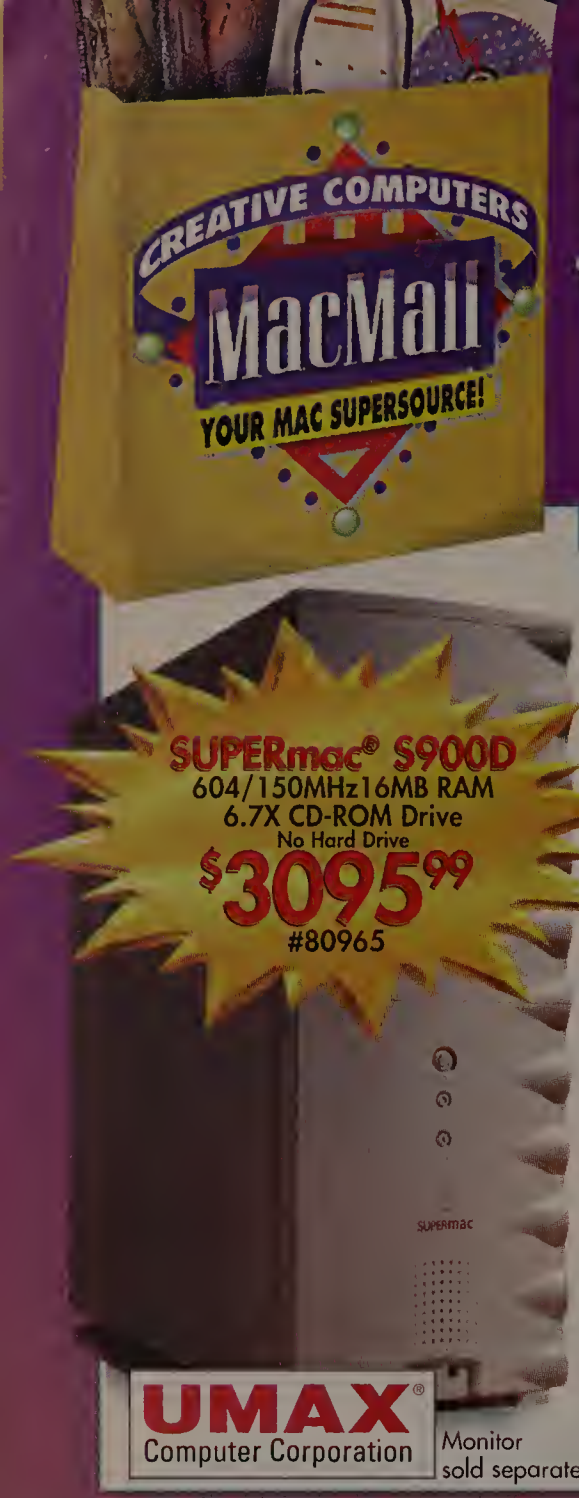

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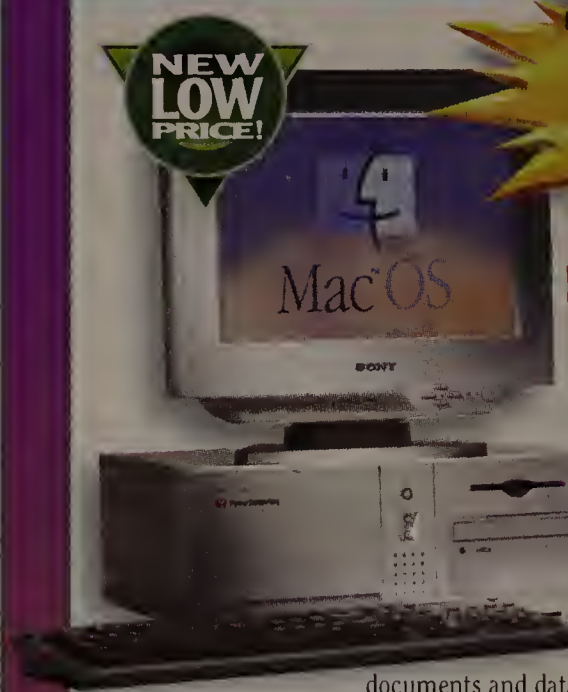

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2147MB	9ms	5400	Micropolis	MC4421	5	$439	$489
2147MB	9ms	5400	Micropolis	MC4421AV	5	$489	$539
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2050MB	8.5ms	7200	Micropolis	MC4221AV	5	$600	$660
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4300MB	8.6ms	7200	Quantum	XP34300	5	$900	$960
9091MB	12ms	5400	Micropolis	MC1991	5	$1749	$1839
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9080MB	11ms	5400	Seagate	ST410800N	5	$1880	$1980
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CDCASE	1 HH CD	40W,1	2.3x9.7x10.4	$89
FHCASE	1 FH or 2HH	65W,1	4x10x10.5	$139
DUALCASE	2 FH or 4HH	2x65W,2	11.9x7.5x12	$250
TOWERCASE	3 FH or 7HH	300W,2	19x9x13	$439
QUADCASE	4 FH or 8HH	4x65W,3	17.4x8.4x11.7	$539

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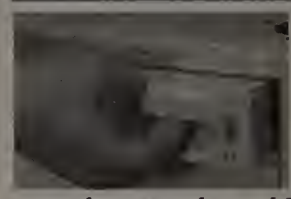
1280MB	12ms	5400	Quantum	FB1280A	3	$216
1700MB	11ms	4500	Quantum	SR31700A	3	$236
2550MB	11ms	4500	Quantum	SR32550A	3	$335
2 1/2"						
540MB	13ms	4200	Toshiba	MK1924FC	1	$270
810MB	13ms	4200	Toshiba	MK1926FC	1	$299
1350MB	13ms	4200	Toshiba	MK2720FC	1	$519
2100MB	13ms	4200	Toshiba	MK2101MAN	1	$649

REMOVABLE DRIVE BRACKET



Converts any 3 1/2" hard drive into a removable drive. Great for transportability, data interchange, or security needs. Extremely high quality construction. Metal cartridge and frame, cooling fan. Unit has SCSI ID select on the cartridge. Qty discounts available.

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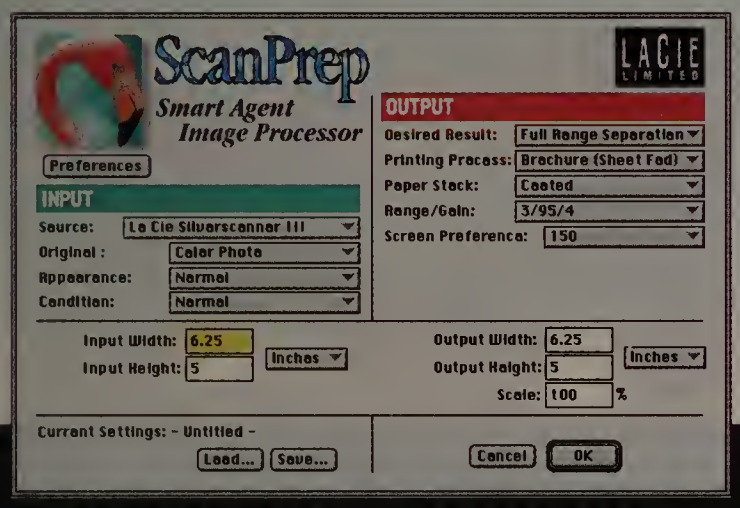

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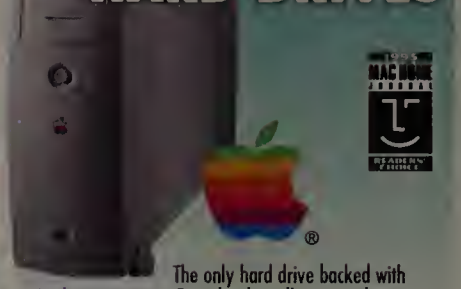

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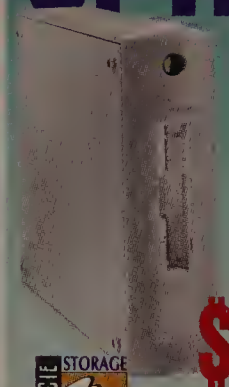

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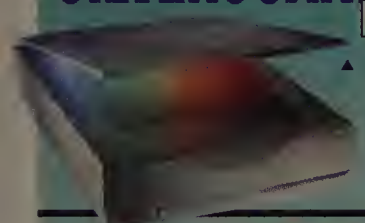

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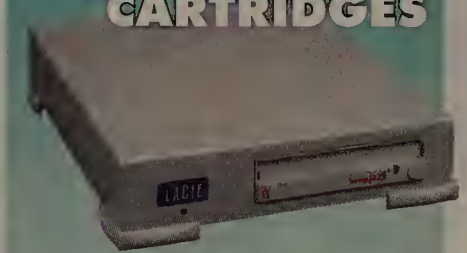

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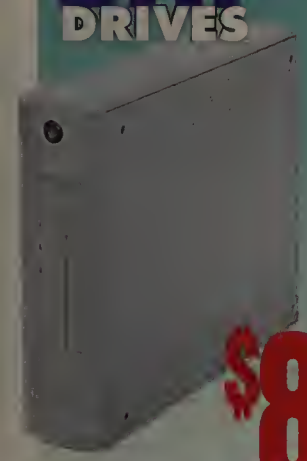

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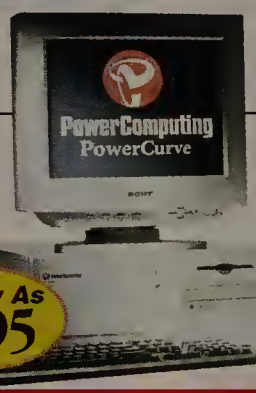

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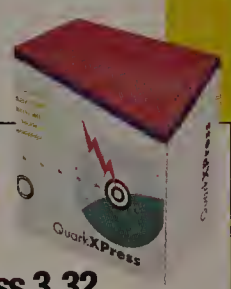

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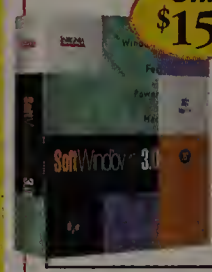

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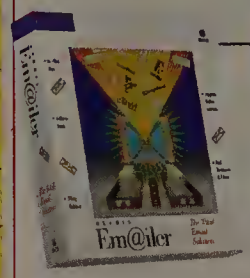

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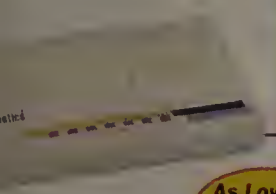

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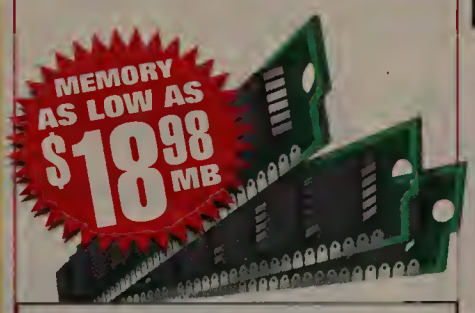

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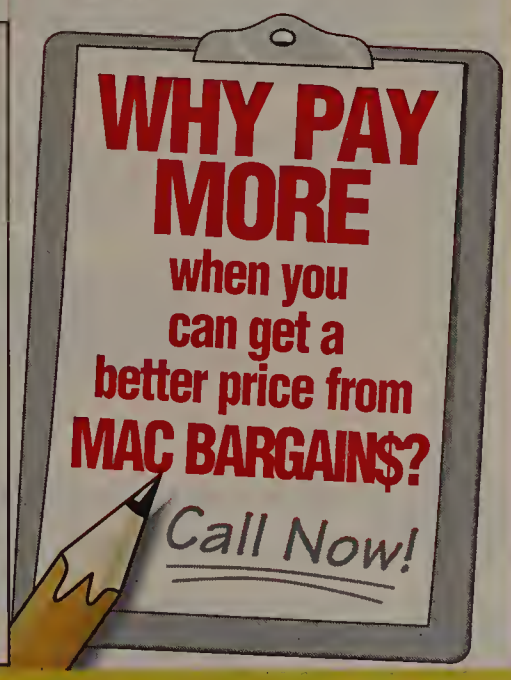

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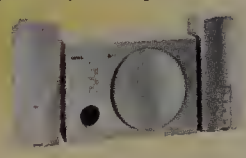

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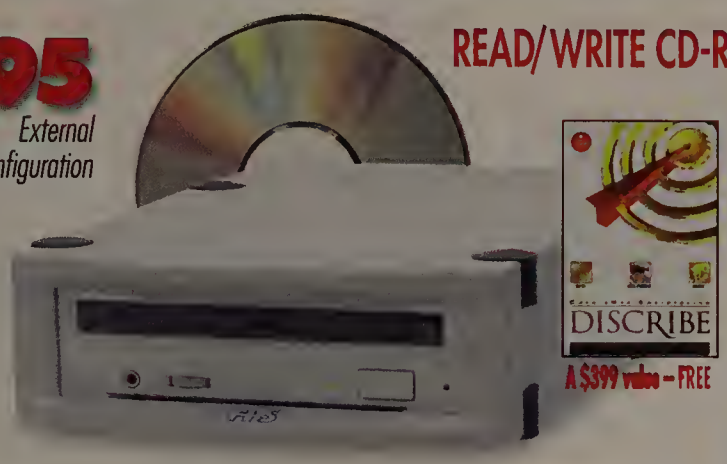

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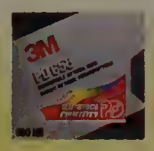

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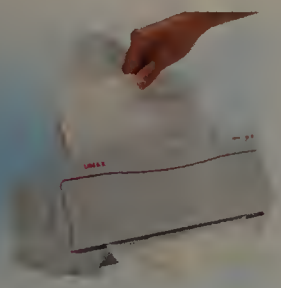

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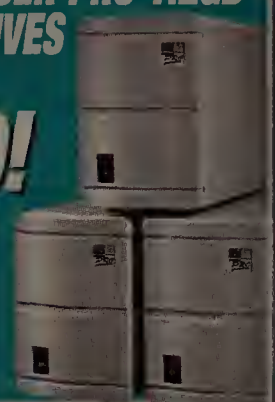

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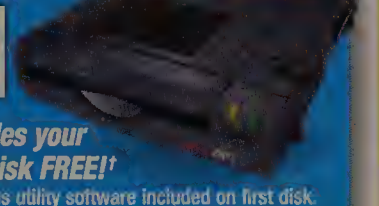

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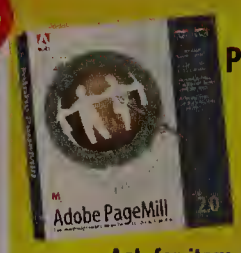

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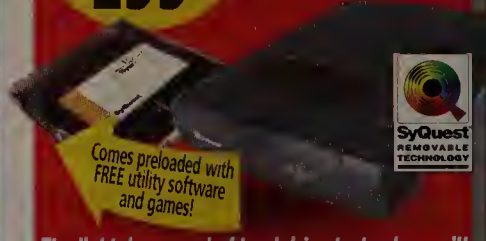

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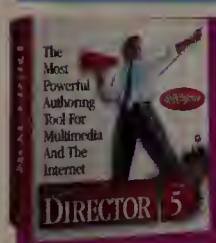

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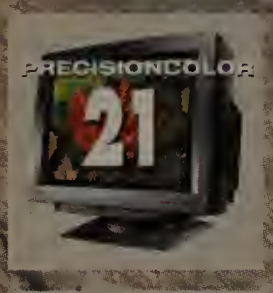

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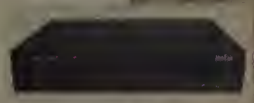

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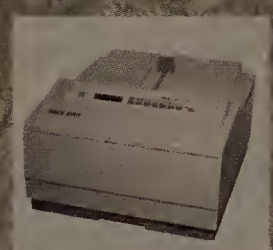

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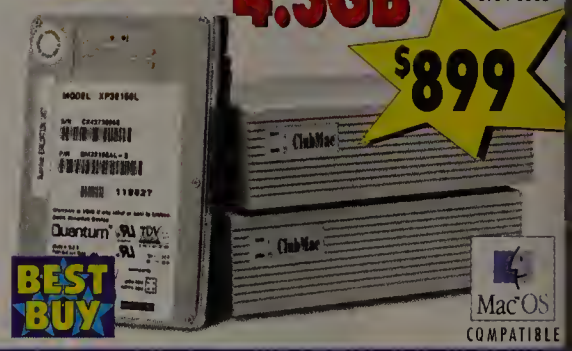

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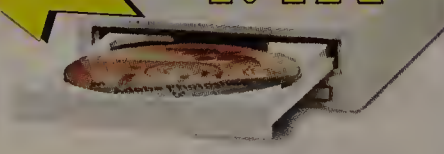

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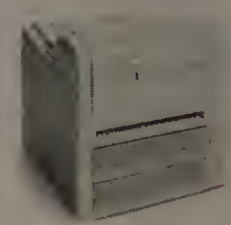

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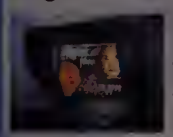

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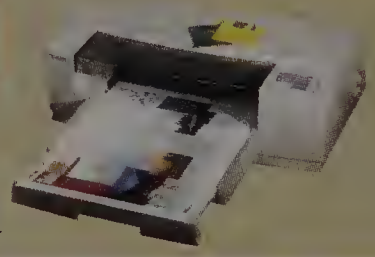

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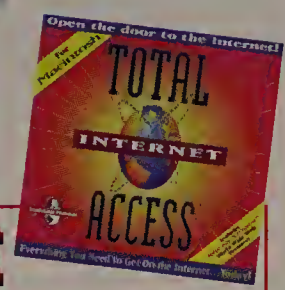

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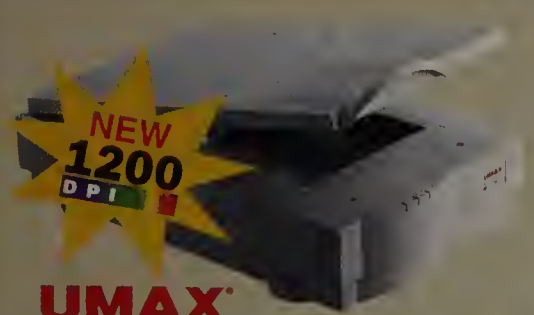

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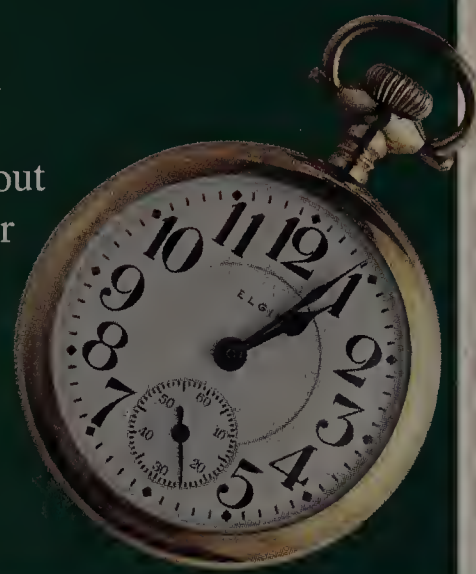

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BBS	
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Memory Upgrades	
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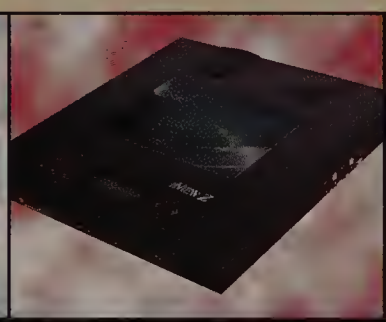
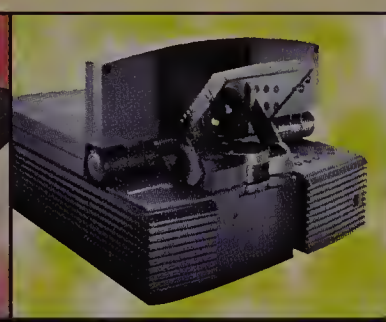

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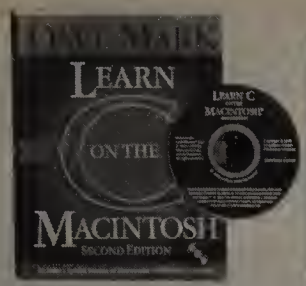

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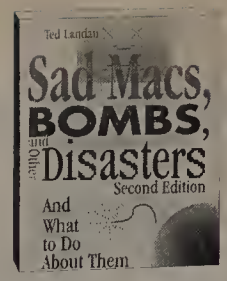

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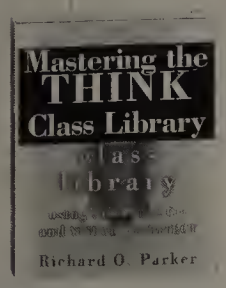

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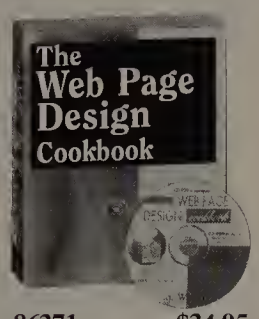

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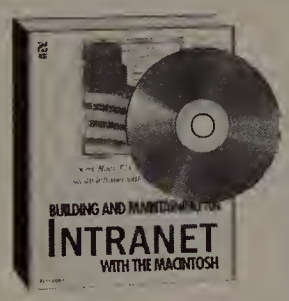

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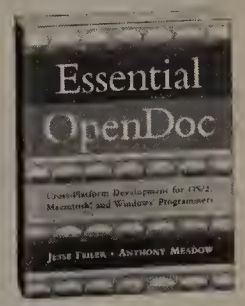

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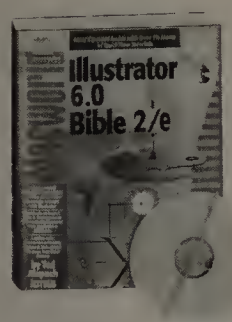

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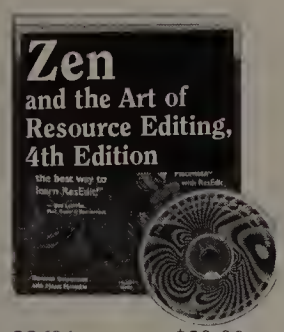

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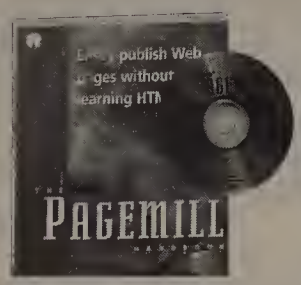

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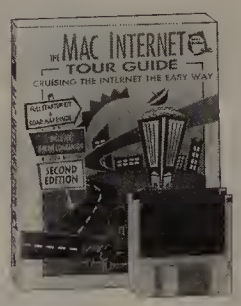

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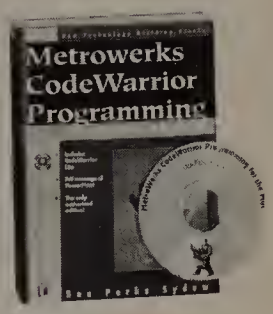

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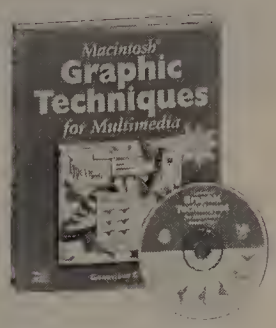

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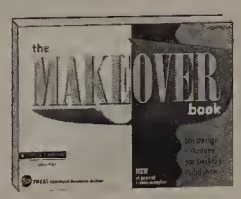

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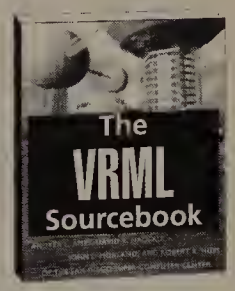

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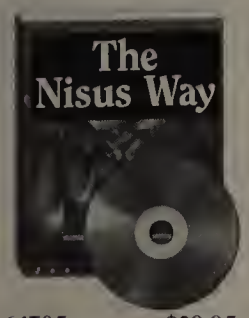

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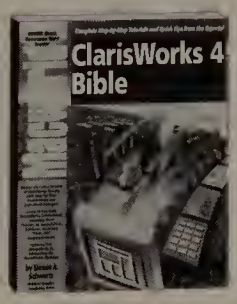

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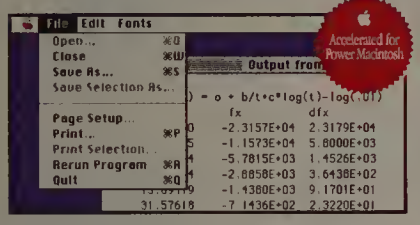

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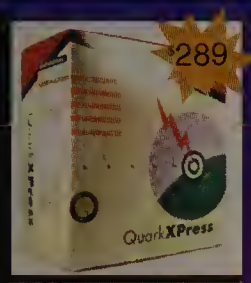

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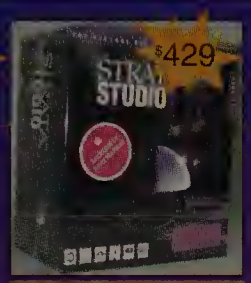

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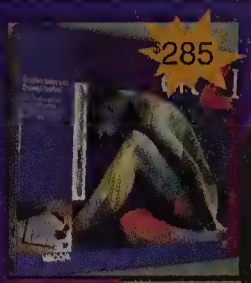

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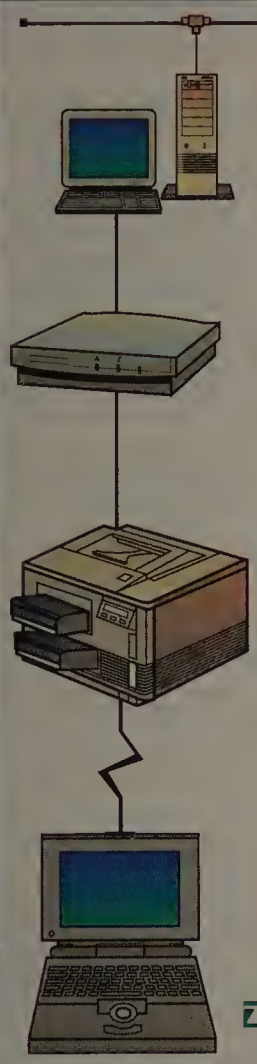

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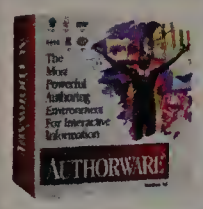

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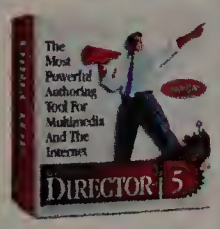

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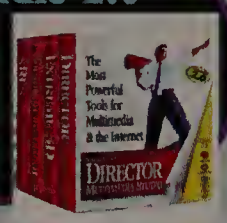

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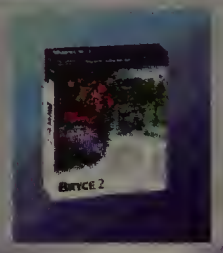

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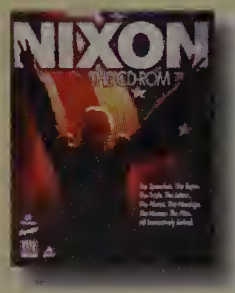

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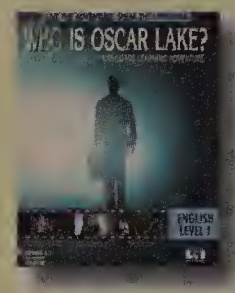

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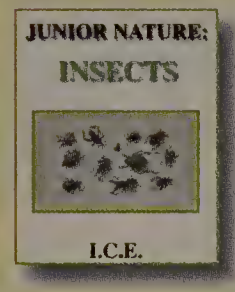

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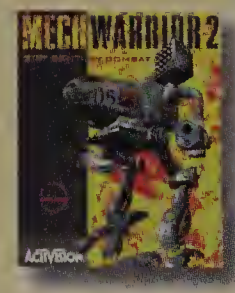

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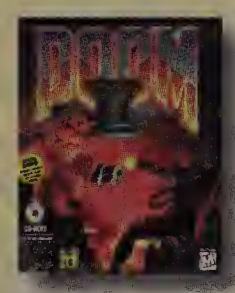

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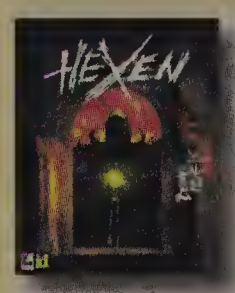

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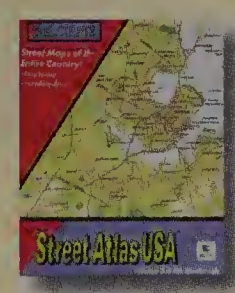

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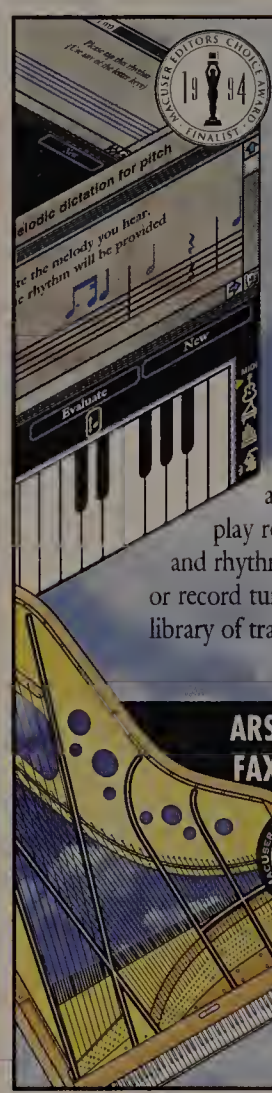

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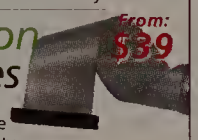

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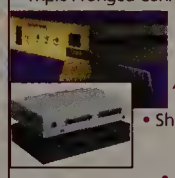

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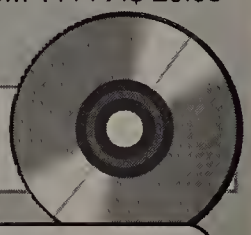

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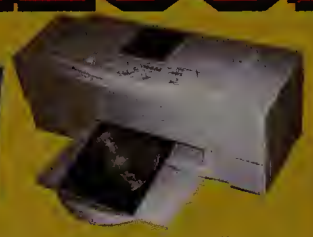

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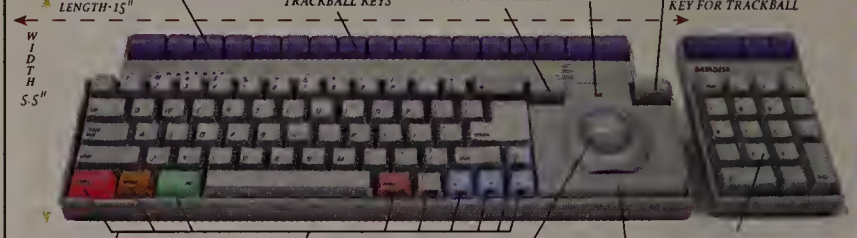

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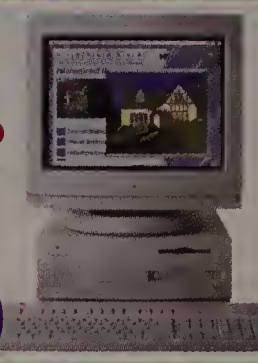

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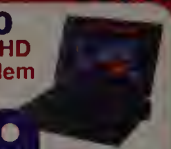

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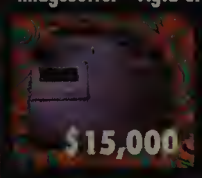

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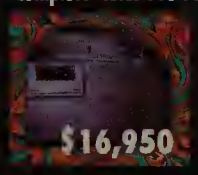

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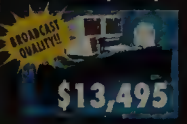

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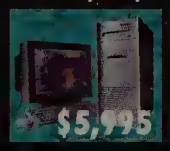

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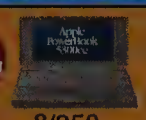

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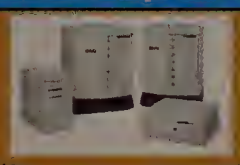

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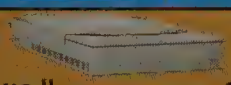

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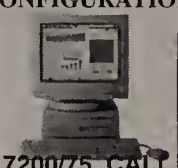

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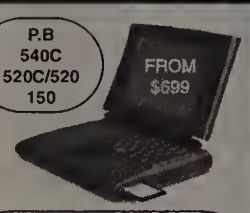

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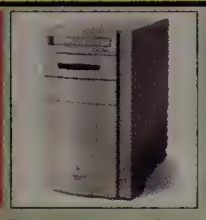

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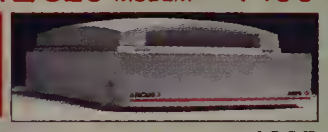

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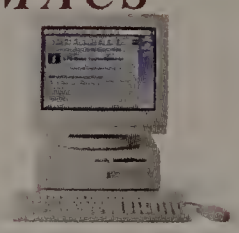

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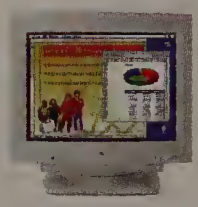

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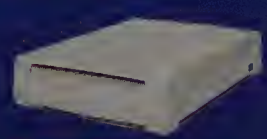

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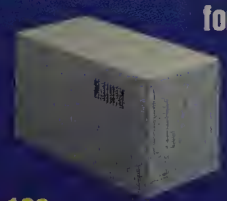

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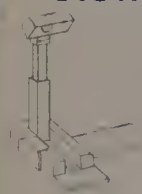

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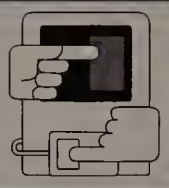

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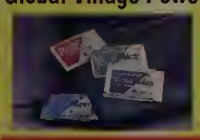

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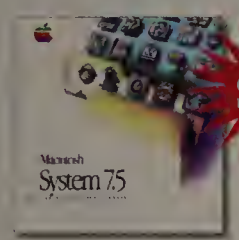

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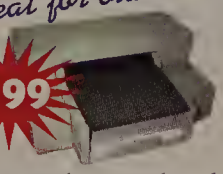

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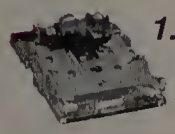

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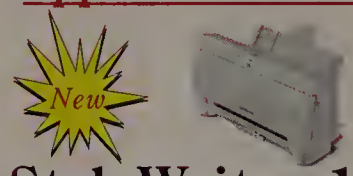

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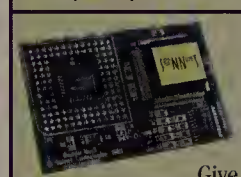

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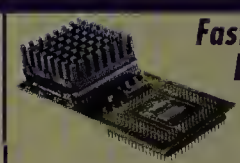

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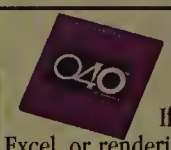

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Apple Power Macintosh 6100/60 (pairs)	8	72	512k	59			39		69			129	259	
Apple Power Macintosh 7100/66 (pairs)	8	136	512k	59			39		69			129	259	
Apple Power Macintosh 7200 (168 pin)	8	136	1mg	69	99		69		89			164	339	679
Apple Power Macintosh 7500/100 (168 pin)	8	136	1mg	69	99		69		89			164	339	679
Apple Power Macintosh 8100/80 (pairs)	8	264	512k	59			39		69			129	259	839
Apple Power Macintosh 6100/66 & 6100/66AV (pairs)	8/16	72					39		69			129	259	
Apple Power Macintosh 7100/66AV (pairs)	16	136					39		69			129	259	
Apple Power Macintosh 7100/80, 7100/80AV (pairs)	8/16	136					39		69			129	259	
Apple Power Macintosh 8100/100, 8100/100AV (pairs)	8/16	264					39		69			129	259	
Apple Power Macintosh 8100/110 (pairs)	8/16	264	512k	59			39		69			129	259	
Apple Power Macintosh 8500/120	8/16	264			69		69		89			164	339	679
Apple Power Macintosh 9500/120, 9500/132	8/16	264	1mg/2mg(120)	69/130	99		69		89			164	339	679
Apple Power Macintosh 9500	8/16	264	1mg	69	99		69		89			164	339	679
Apple LaserWriter LS	512k	1				512k=37								
Apple LaserWriter NTR	3	4				54								
Apple LaserWriter NT	2	8							94					
Apple LaserWriter II NTX	2	12					79		290					
Apple LaserWriter II NTX-J	4	12					79		290					
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Apple LaserWriter IIg	5/8	32					79					219	439	
Apple LaserWriter Select 300	512k	4.5				1mg=34	39							
Apple LaserWriter Select 310	1.5	5.5				1mg=44	39							
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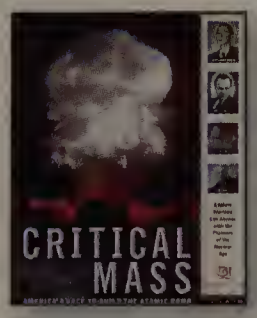

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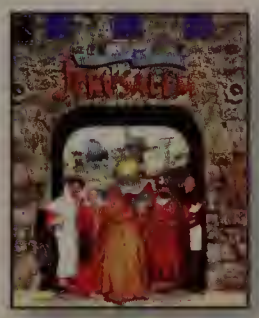

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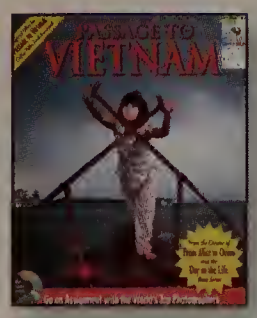

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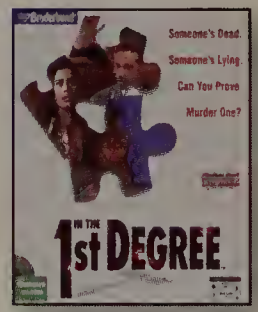

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Circle 157 on reader service card

W49

Viewpoint

by Douglas Adams

Dongly Thing

A POX ON THE PANOPLY OF PLUGS

TIME TO DECLARE WAR, I think, on little dongly things. More of them turned up in the post this morning. I'd ordered a new optical disc drive from an American mail-order company, and because I live in that strange and remote place called "Foreign," and also because I travel like a pigeon, I was keen to know, when ordering it, if it had an international power supply.

An international power supply is the device which means it doesn't matter what country you're in, or even if you know what country you're in (more of a problem than you might suspect), you just plug in your Mac and it figures it out for itself. We call this principle Plug and Play. Or at least, Microsoft calls it that because it hasn't got it yet. In the Mac world we've had it for so long we didn't even think of giving it a name. Nowadays a lot of peripherals come with international power supplies as well—but not all. Which is why I asked.

"Yes, it does," said Scott, the sales assistant.

"You're sure it has an international power supply?"

"Yes," repeated Scott. "It has an international power supply."

"Absolutely sure?"

"Yes."

This morning it arrived. The first thing I noticed was that it didn't have an international power supply. Instead it had a little dongly thing. I have rooms full of little dongly things and don't want any more. Half the little dongly things I've got, I don't even know what gizmo they're for. More importantly, half the gizmos I've got, I don't know where their little dongly thing is. Most annoyingly, an awful lot of the little dongly things, including the one that arrived this morning, are little dongly things that run on 120 volts AC—American voltage, which means I can't use them here in Foreign (state code FN), but I have to keep them in case I ever take the gizmo to which they fit (provided I know which gizmo it is they fit to) to the USA.

What, you may ask, the hell am I talking about? The little dongly things I am concerned with (by no means the only species of little dongly things with which the microelectronics world is infested) are the external power adapters which laptops and palmtops and external drives and cassette recorders and telephone answering machines and powered speakers and other incredibly necessary gizmos need to step down the main AC supply from either 120 volts or 240 volts to 6 volts DC. Or 4.5 volts DC. Or 9 volts DC. Or 12 volts DC.

At 500 milliamps. Or 300 milliamps. Or 1200 milliamps. They have positive tips and negative sleeves on their plugs, unless they are the type with negative tips and positive sleeves.

By the time you multiply all these different variables together, you end up with a fairly major industry which exists, so far as I can tell, to fill my cupboards with little dongly things, none of which I can ever positively identify without playing gizmo pelmanism. The usual method of finding a little dongly thing that actually matches a gizmo I want to use is to go and buy another one, at a price that can physically drive the air from your body.

Now why is this? Well, there's one possible theory, which is that just as Xerox is really in the business of selling toner cartridge, Sony is really in the little dongly power-supply business.

Another possible reason is that it is sheer blinding idiocy. It couldn't possibly be that, could it? I mean, could it? It's hard to imagine that some of the mightiest brains on the planet, fuelled by some of the finest pizza that money can buy, haven't at some point thought, "Wouldn't it be easier if we all just standardised on one type of DC power supply?" Now, I'm not an electrical engineer, so I may be asking for the impossible. Maybe it is a sine qua non of the way in which a given optical drive or CD Walkman works that it has to draw 600 milliamps rather than 500, or have its negative terminal on the tip rather than the sleeve, and that it will either whine or fry itself if presented with anything faintly different. But I strongly suspect that if you stuck a hardware engineer in a locked room for a couple of days and taunted him with the smell of pepperoni, he could probably think of a way of making whatever gizmo (maybe even the new gizmo Pro, which I've heard such good things about) it is he's designing work to a standard DC low-power supply.

In fact, a kind of rough standard already exists, but it's rather an odd one. Not many people actually smoke in their cars these days, and the aperture in the dashboard which used to hold the cigar lighter is now more likely to be powering a mobile phone, CD player, fax machine, or according to a recent and highly improbable TV commercial, an instant-coffee-making gizmo. Because the dashboard socket originally had a different purpose, it's the wrong size and in the wrong place for what we now want to do with it, so perhaps it's time to start adapting it for its new job.

The important thing this piece of serendipitous preadaptation has given us

continues on page 201

JAMES YANG

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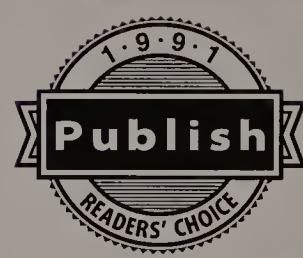

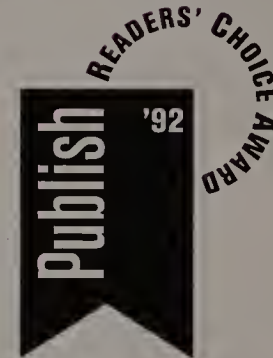

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